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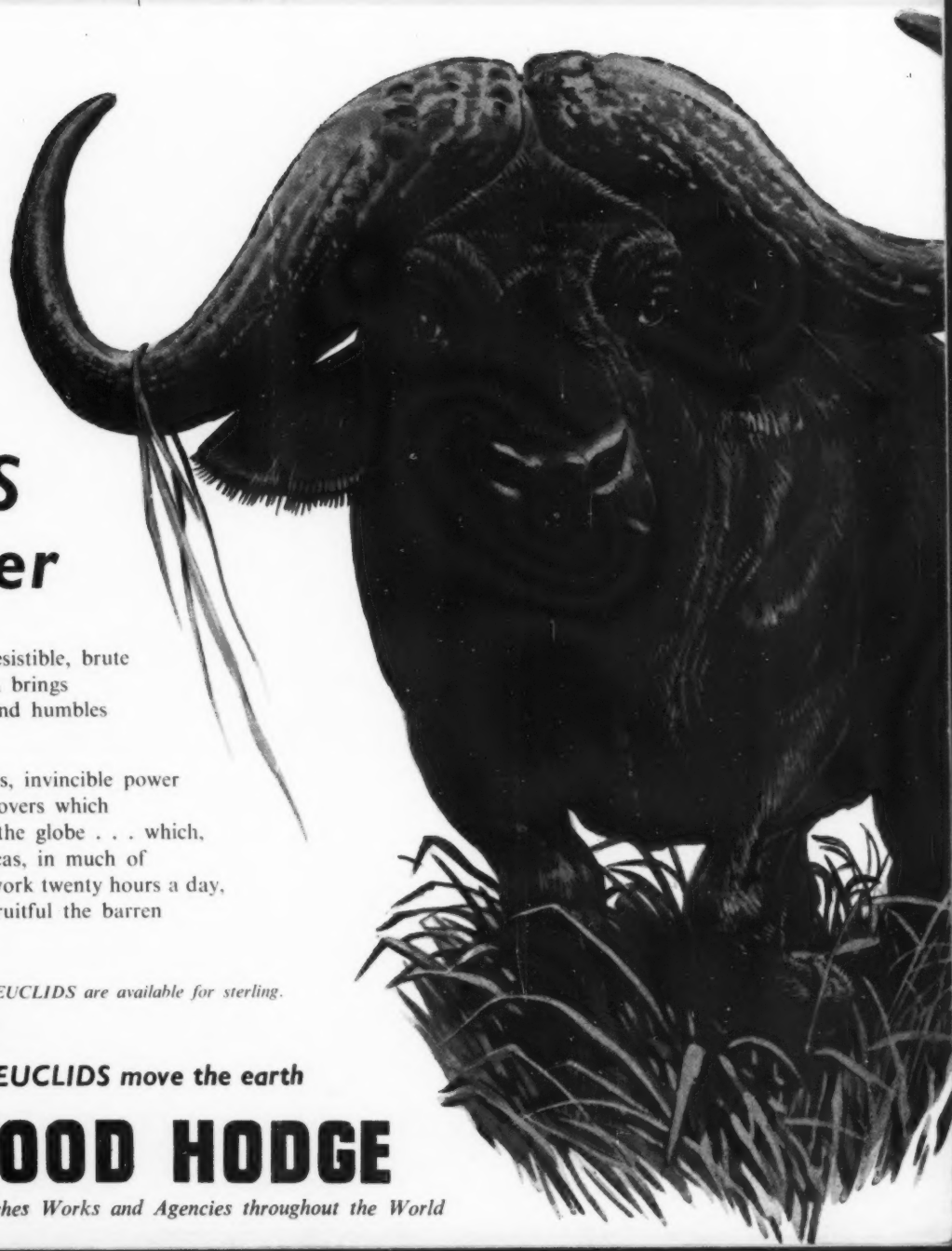

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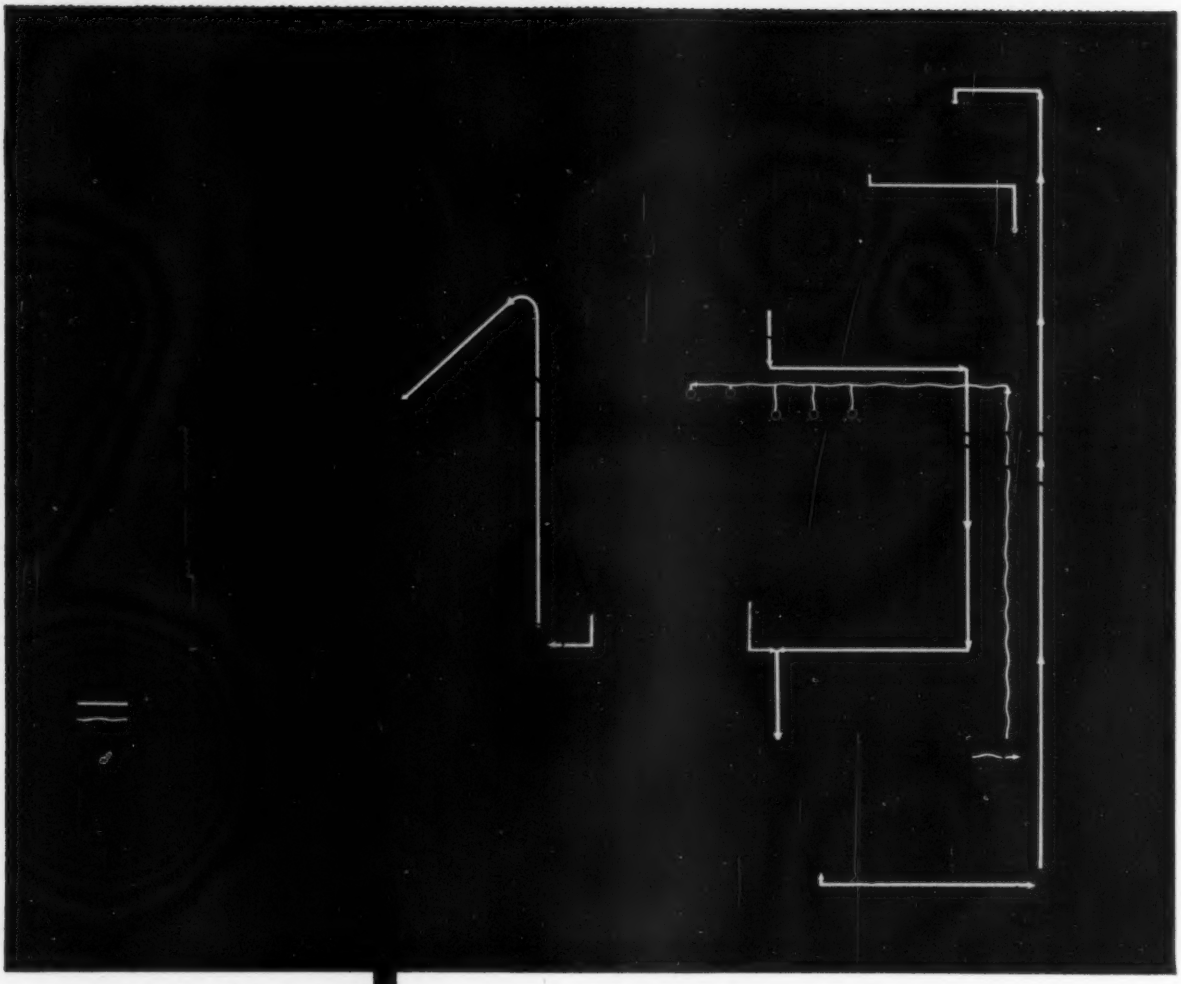

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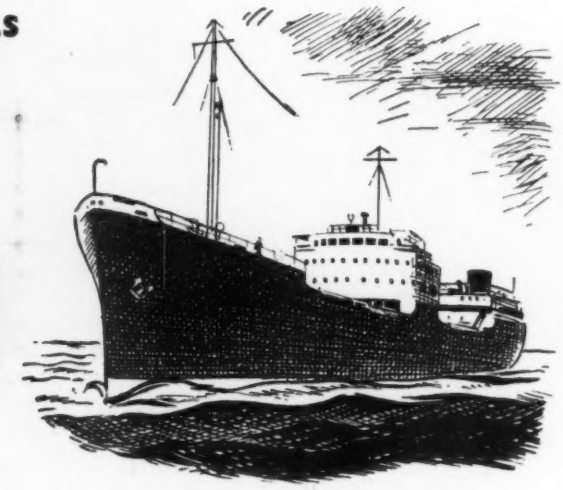

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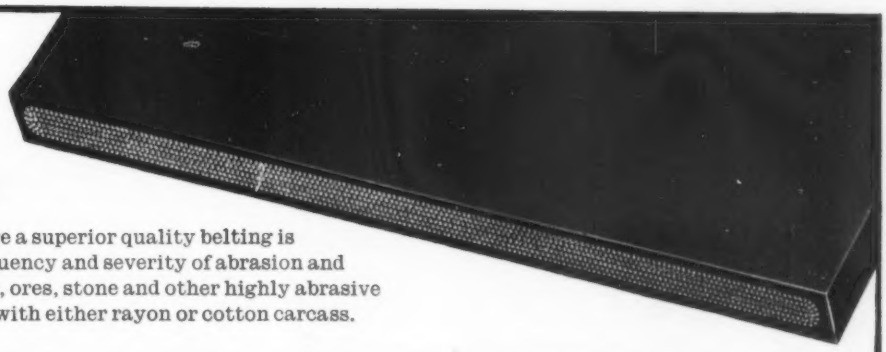

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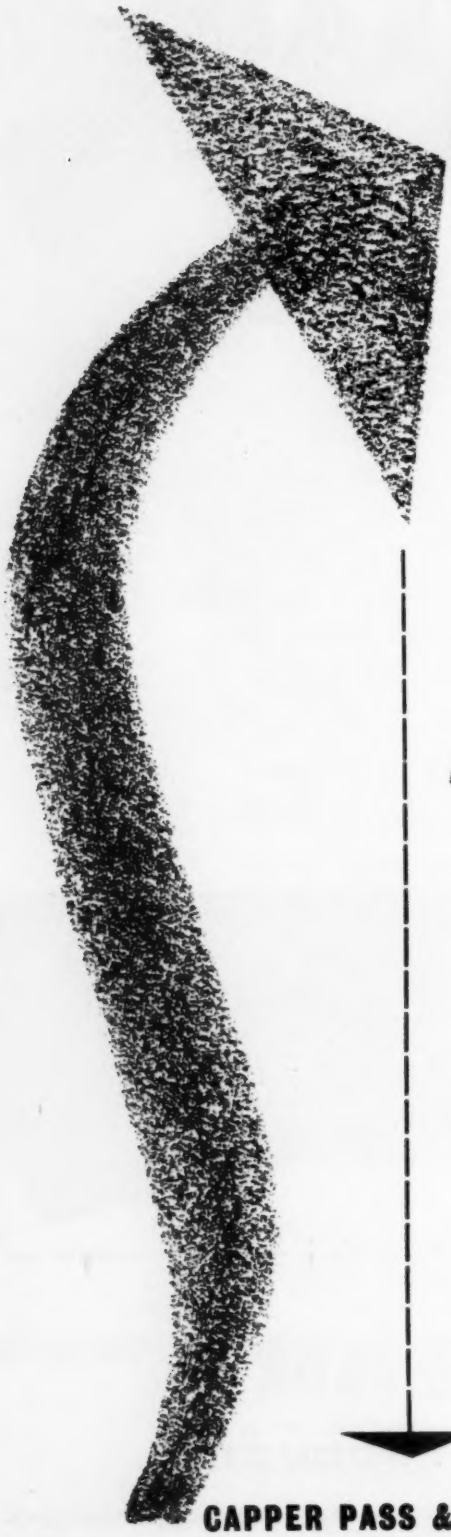

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The Mining Journal

London, May 30, 1958

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The Substance or the Shadow?

THE mineral resources of the Sahara were surveyed in our issue of May 16, 1958, pp. 566-568. A second article appearing in the present issue (p. 630) discusses some of the problems involved in the exploitation of the rich deposits now being uncovered in the interior of this vast desert, which are potentially capable of transforming the economic outlook of France. Indeed, the Sahara's minerals—particularly its newly tapped oil reserves—might well become critically important to the entire Western World, whose foothold in the Middle East becomes increasingly precarious in the absence of any constructive or consistent policy.

Unfortunately, the difficulties hampering the development of the Sahara are not only physical and economic but also political. The various deposits are situated hundreds of miles apart in an arid and sparsely populated region. Huge capital investments are needed to build railways and provide reasonable living conditions for workers in these areas. Wells have to be bored and towns built in selected sites.

But no less formidable than the technical and financial problems is the task of providing political conditions which would allow the rich mineral, oil and water-power resources of the Sahara to be developed under French leadership.

A constructive attempt to separate economic development from the political difficulties arising from the struggles for independence waged successively by Tunisia, Morocco and Algeria was made at the end of 1956, when an authority known as the Joint Organization of Saharan Regions was approved by the French Assembly. This authority was given economic and military functions but not political and administrative ones. Directly dependent on the Prime Minister's office and with qualified government authorization to negotiate within its own sphere with international bodies or foreign states, it is intended to provide the necessary unity of control for economic development without provoking disputes with nascent nationalism.

Unhappily, the political situation in North Africa has rapidly gone from bad to worse, due to the inability of successive French Governments to resolve the Algerian troubles either by suppression or integration. Ironically, the allure of Saharan riches, far from promoting the closer co-operation which is essential to their effective exploitation for the common benefit, has in all probability tended to aggravate political differences between France and the three African territories. On the one hand, the belief that the Sahara could make France independent of Middle Eastern petrol and provide the basis for an economic development without precedent in French history makes Frenchmen all the more reluctant to entertain ideas of complete political separation from the Saharan countries. At the same time, the knowledge that the Sahara contains great potential wealth has made the inhabitants of Tunisia, Morocco and Algeria (whether of European or African descent) increasingly possessive in their attitude towards the desert wastes.

Oil pipelines are particularly susceptible to insurgent action. In the event of a major rebellion, thousands of French troops would be required for the protection of the 24-in. Hassi Messaoud pipeline, which is scheduled for completion in the autumn of 1959. The 16-in. Edjele pipeline, across Libya or Tunisia, would be safer from Algerian rebels, but here the French Government would be open to political pressure if its North African policy proved unacceptable to the Tunisian or Libyan Governments.

Whatever form of government may emerge from the present crisis, it is thus evident that one of its most urgent tasks is to end the Algerian war speedily, on terms acceptable to both sides, and above all to prevent it from spreading into Tunisia and Morocco. Otherwise the Sahara's mineral riches might become as elusive as its mirages and might be permanently lost to the Western World.

Should General de Gaulle obtain full political powers, it is possible that the liberal opinions about the future of French Africa with which he has often been credited might facilitate a practical solution of the Algerian problem. He is perhaps the one man who would be acceptable not only to the army but also to many of the Africans themselves, while the idea of a Franco-African community, which he has so often propounded, presumably accords with the conception of complete integration with the Muslim population which has been accepted, at any rate publicly, by the settlers since the rising of May 13 in Algiers.

To reach a satisfactory settlement will call for statesmanship and leadership of the highest order. Given these requisites, there is no reason why the political problems should prove more intractable than the physical and econonomic difficulties which French skill and enterprise are successfully surmounting.

SYMPTOMS AND CAUSES

As was to be expected from someone of his standing in the industry, Monsieur Sengier had some pertinent observations to make on the state of the copper market when addressing shareholders at the annual meeting of the Union Minière in Brussels last week. In particular it is interesting to find in his statement confirmation of the view already expressed in these columns that the weight of metal at present kept off the market by the few U.S. Gvernment floor price contracts still in force (estimated to be around 90,000 l.tons a year) is sufficient to ensure that the copper price is unlikely at any rate this year to go above the price level at which this tonnage would be thrown back on the market, namely, progressively from 27 to 29 c. per lb.

He then goes on to observe with masterly understatement, that these government contracts "as well as other measures contemplated in the United States are not of a nature to balance world production and consumption". Considering the part which his own company has quietly taken in cutting back production during the past nine months or so, he has every right to insist, as his remarks clearly imply, that talk of tariffs, quotas, subsidies, etc. (measures which in any case cannot yield immediate results) are in the short-term no substitute for direct action in bringing production back into balance with consumption.

Monsieur Sengier is perhaps on more debatable ground when he suggests that it was the high prices reached at the end of 1955 and beginning of 1956 which were responsible both for the opening up of intrinsically uneconomic copper mines and for the trend towards substitution. It is certainly true enough that these high prices have had the effects he describes, although we would think that the bulk of the sub-economic copper mining which has occurred in recent years has been directly as a result of government floor price contracts for strategic purposes, and would have occurred whatever the price position. Prices can do no more than reflect the interplay of market factors, and it is surely to these that we must look for the causes of the industry's troubles.

Broadly these troubles have derived, not from any inadequacy in the natural rate of growth of the industry, or from any wide fluctuations in civilian consumption, which indeed has been trending upwards with remarkable consistency in the post-war years. They have come almost entirely from the impact of post-Korean government stockpiling and pre-emptions for strategic purposes which first artificially accelerated the rate of new investment in the industry but which by the time the new mines were coming into full production was again causing total offtake to decline sharply in consequence of the tailing off of stockpile programmes. This pattern is, of course, by no means confined to copper, although the consequences have perhaps been more spectacular here than with other metals. At the same time, the natural rate of growth of civilian consumption of copper promises to continue at so high a rate that the present imbalance between production and consumption is hardly likely to cause any long-term dislocation in the industry. It is the short-term position which causes anxiety and in the short-term if too much copper is being produced, only two things can be done—build up stocks, and/or cut back production. Price cutting is no substitute for either except at the margin, although a sharp fall in price may well reflect a failure to do either.

Production has, of course, been cut—whether sufficiently has yet to be seen. Stocks are only piling up at the moment to any extent in the United States where producers' stocks have increased by some 65,000 tons since the beginning of the year, largely as a result of the U.S. producers persisting in holding their domestic price above the world price. It is no doubt true, as Monsieur Sengier points out, that consumers more especially in Europe are tending at the moment to buy very much on a day-to-day basis but at the same time it is difficult to foresee any substantial increase in copper deliveries to Europe while the present price differential remains.

Copper dealers have since the war been in the difficult position of trying to operate a free market under conditions which are not wholly free. The copper market has had to operate against a background of price fixing, of long-term contracts which by-pass the market, and above all under conditions of heavy and unpredictable government intervention, not it is true by way of imposing any restriction on the operation of the market, but simply in consequence of the scale of its operations and the rapidity with which its requirements have grown and then subsequently shrunk.

URANIUM AND MONAZITE IN INDIA

The Government of India has under consideration a proposal to set up a crude uranium plant at Bombay to mill and process about 500 tons a day of uranium ore with provision for expansion to deal with double this quantity. The plant will beneficiate the ore as it is received from the mines, after initial milling, and obtain a uranium concentrate by chemical bleaching. It is being designed under the supervision of the Atomic Energy Commission.

Meanwhile, the Department of Atomic Energy has decided to set up a plant for the production of uranium metal. The Indian Rare Earths (Private) Ltd. has been entrusted with the responsibility of erecting the plant,

which is expected to be ready by the end of this year. This company was formed with the object of processing monazite found in the beach sands of Travancore. At present the plant treats 1,500 tons of monazite per year.

The firm says that sales of the by-products, rare earths chloride and trisodium phosphate, continue to be unsatisfactory. It has a large stock of rare earths chloride (solid) but even after substantial reduction in price there has been little demand. The report adds that owing to the large output in other countries, particularly in the United States and Brazil, and limited world requirements, the sale of this product in foreign countries has not been engouraging.

Trisodium phosphate is sold exclusively in the Indian market and the demand has been satisfactory. The company, whose entire capital has now been paid up—Rs.6,400,000 by the Government of India and Rs.3,600,000 by the Government of Kerala—is managed by a board of directors.

MINERALS RESEARCH IN TURKEY

In order to evaluate the mineral resources of Turkey, two Government Administrations attached to the Ministry of Economy were established in 1933, namely, the Petroleum Research and Exploitation Administration and the Gold Research and Exploitation Administration. These two establishments were considered inadequate for developing the mineral resources of the country. The Mineral Research and Exploration Institute of Turkey (M.T.A.) was therefore formed by a special Act (No. 2804) on June 22, 1935, to prospect and explore the country's mineral resources systematically—including all kinds of minerals, water and raw materials—and the two Administrations were incorporated in the Institute.

The Institute has prepared geological and tectonic maps of Turkey in 1/800,000 scale and completed 444 geological map-sheets of 1/100,000; in addition, seven map-sheets of a 1/500,000 scale geological map have been compiled and prepared for printing and publication, and the remaining 14 sheets, to cover the whole country, will be completed by 1961. Several geological maps—in scales of 1/25,000 1/10,000, 1/5,000 and 1/2,000—have also been prepared for various purposes such as oil, coal and lignite field investigations, ore and mineral deposits, and hydro-geological surveys.

Petroleum geological surveys have been carried out in the following districts: Raman, Garzan, Cizre, Urfa, Gaziantep in South-Eastern Anatolia; Hasankale and Van in the East; Ankara and Kastamonu in Central and Northern Anatolia; Antalya, Hatay and Adana in the South; and Thrace.

Fifty drill holes have been completed to the depth of 79,139 m., 51,467 m. of which was done from 1950 to 1954, and over 10,000,000 tons of reserves have been proven in Raman and Garzan oil fields. These oil fields were transferred to a Turkish company called Türkiye Petrolleri A.O., which was established by law (No. 6327) in 1954, and subsequent oil explorations have been continued by T.P.A.O. Since the organization of this company, the Institute has confined its oil prospecting activities to other parts of Turkey. At present T.P.A.O. is operating on the Raman and Garzan fields and producing 300,000 tons of crude oil annually.

Most geophysical methods have been applied since 1938 in the search for oil and minerals. With its own seismic, gravity, magnetic and electrical field crews M.T.A. has investigated a large part of the country. Seismic surveys have included most of the Adana basin, and some parts of Raman, Garzan and Kentalan fields, the Cizre area in the South-Eastern basin, and the Lüleburgaz area in Thrace. Detailed gravity and magnetic studies for oil have included Adana, Iskenderun, Hatay basins; Diyarbakir, Bismil, Raman and Garzan regions, Urfa, Gaziantep and Cizre areas in the South-East, and Bor, Eregli, Karaman and Aksaray plains in Central Turkey. Part of Central Turkey and the whole of Thrace have been subjected to regional gravity and magnetic investigations.

Some deep resistivity surveys have been carried out in the determination of oil structures, such as those at Sazgin and Cizre, Rubaikale and Mürefte. Most of the electrical surveys, however (self-potential, resistivity and electrical-well logging), have been applied extensively since 1938 in the search for sulphide, coal, lignite and iron deposits. Resistivity surveys also included some ground-water investigations around the Konya and Ankara plains. Magnetic and—to a limited degree—gravity methods have also been used in the exploration of magnetic iron ores and chromite deposits.

The mineral investigation and exploration activities of the Institute have been concentrated on deposits which are important for the immediate as well as the long-range economic needs of the country. Some twenty deposits so far found have been evaluated and transferred to private or State-owned operating organizations.

The deposits of base minerals so far discovered by the Institute are estimated to contain the following reserves (in tonnes): cinnabar, 80,000; chrome ore, 92,000; iron ore, 16,000,000; antimony, 20,000; bauxite, 5,000,000; barytes, 7,000,000; and colemanite (borate), 3,000,000.

There are also twelve coal and lignite deposits estimated to contain a total of 138,060,000 tonnes valued at £T3,742,050,000.

In addition, the Institute has prospected 5,700 mineral occurrences in order to determine the metallogenic provinces of Turkey.

Prospecting and geological surveys have shown that the provinces of Giresun, Gümüshane, Canakkale, Balikesir, Mugla and Hatay appear favourable in scheelite, chromite, bauxite, iron, lead, antimony, pyrite, copper and gold occurrences; therefore, detailed investigations have started in these regions.

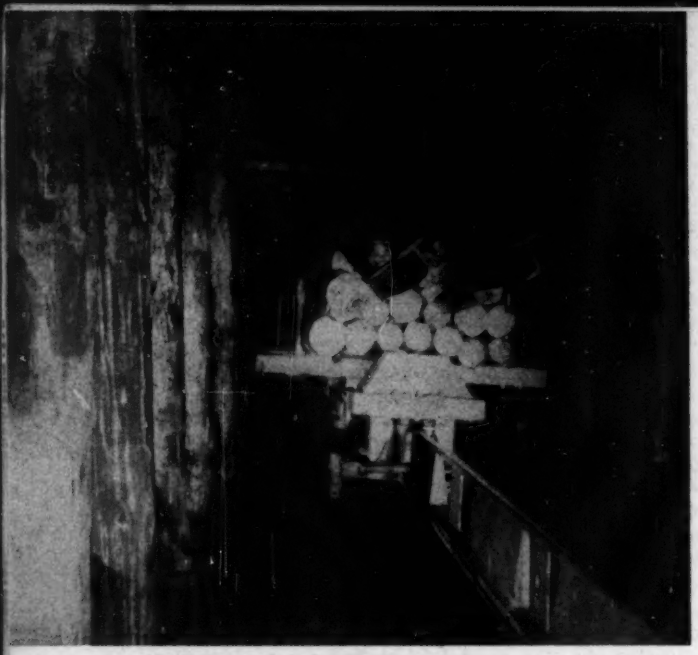
The Institute has determined the districts where radioactive minerals may possibly be found.

The Institute is operating on a non-profit basis. Since its foundation it has spent £T147,000,000, of which approximately £T10,000,000 is invested in fixed assets. £T126,000,000 was obtained from the general budget as government aid and £21,000,000 from other resources of the Institute.

EAST EUROPEAN COUNTRIES TO BOOST COAL

Hungary is to spend nearly £20,000,000 this year on colliery development projects aimed at boosting production of coal by 1,500,000 tons. Emphasis is being placed on the need to mechanize underground operations in an effort to reduce costs and labour requirements. Last year Hungary produced 21,000,000 tons of coal and so far this year production is running at a record high level. Much of the mining equipment required will be home manufactured.

In Poland also efforts are being made to step up coal production. This augurs well for Polish and German mining machinery manufacturers who between them supply most of the requirements of the Polish mining industry. It is reported from Poland that Britain is to send some 1,500 drilling machines and several coal cutters, in addition to several hundred hydraulic props. The opencast coal industry is also expanding and the U.S.A. is to supply most of the heavy equipment for strip mining operations.



The Monoveyor is a more powerful diesel-hydraulic version of the Mono-Rail Transporter which, in the post-war years, has become firmly established as a cheap and flexible form of material transporter for construction sites.

The Monoveyor Underground Transport System

SOME of the attractive features of the Monoveyor, a new system of underground transportation recently introduced into mining, are that 100 yds. of track can be laid over a rough floor by two men in 30 min. and the equipment has driveless operation, a gradability of 1 in 12 and an overall width of 2 ft. 6 in. In the new equipment the prime-mover consists of a Coventry Victor Vixen 20 h.p. horizontally-opposed twin-diesel engine, fully flame-proofed and fitted with an exhaust scrubber.

Three gear-type hydraulic pumps are driven by the engine and these in turn motorize six hydraulic motors—two on the loco and two on each of two trailers, so achieving six driving wheels to a unit. Each unit will tow a further unpowered trailer when negotiating gradients up to 1 in 12 on which gradient it will stop and start, or alternatively, under conditions where the gradients do not exceed 1 in 30 it will tow four unpowered trailers. Each trailer, powered and unpowered, has a load-carrying capacity of 1,800 lb. and bodies can be applied to meet any specific requirements.

Stability of the machine is achieved by the use of stabilizing wheels located at both ends and both sides of each individual unit. They are independently adjustable and make contact on the channel at the bottom of the rail. Unlike dual rail, it is virtually impossible to derail the equipment.

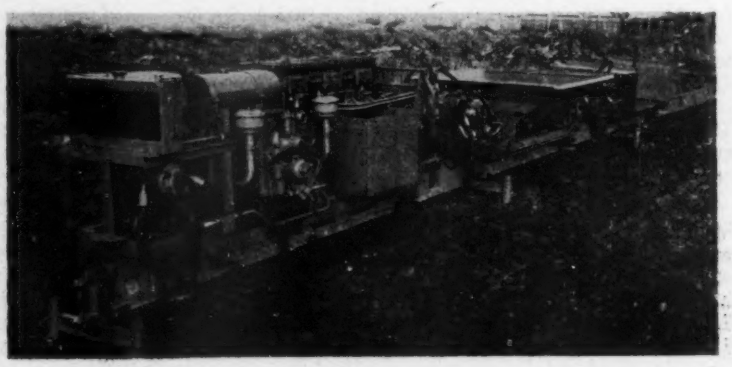
Forward, reverse and stopping levers are easily accessible and duplicated on the other side; these actuate three control valves situated on the side of the fluid reservoir, each valve operating one pair of motors.

Dead-man types of brakes are incorporated, one to each motor; they are included in the hydraulic system and are applied until there is sufficient pressure in the pipes to release them, giving safety and control of over-run when negotiating a down gradient. The width of the equipment has been kept within 2 ft. 6 in. and the overall height down to 4 ft.

Automatic stopping is possible by inserting a stop in any of three positions in each rail; a trailing shoe making contact with the auto-stop will disengage the operating lever and the brakes will immediately operate. Self-sealing type couplings are employed, making uncoupling a simple and speedy operation; they also eliminate loss of fluid.

The rail may be laid with exceptional ease and speed; under average conditions 100 yds. can be laid by two men in 30 min. In addition, it allows for a 3 deg. deflection horizontally and a 4½ deg. deflection vertically. Straight rails are in standard 12-ft. lengths easily carried by two men. Curved rails in standard 6-ft. lengths are constructed to 12-ft. radius. Points are operated by foot pedal.

The Monoveyor should provide a most acceptable solution to the problems encountered in handling materials alongside a mothergate conveyor, supplying materials to underground construction works, handling ore and materials along contour drives, and to many others in comparable conditions. Used without the loco, advantage might well be taken of the ease and speed of tracklaying in many hand-tramming applications.



Above : The Monoveyor used in hand-tramming materials inbye in a Scottish coal mine

Alongside (at right) : Protoype Monoveyor unit with all cowlings removed to expose works

Non-ferrous Metals in Brazil

PROFESSOR MEHL, reporting to the Brazil-United States Commission in 1952 on Brazil's non-ferrous metal reserves, recommended a long-term programme of research, to include aerial surveys. He considered that systematic study might show Brazil to be the richest source of minerals in the world. The country has always suffered from a serious shortage of geologists and new discoveries were usually the result of chance, mineral deposits being found by accident in the course of agricultural or construction work or exploration.

Since 1952 ground and air prospecting have been speeded up, the Department of Mineral Production being assisted by experts of the U.S. Geological Service and others engaged under contract in Europe. Special attention has been paid to the search for copper, aluminium, zinc, lead and tin, substances of outstanding economic interest to Brazil.

Copper, Aluminium and Zinc

Numerous deposits of copper are known to exist in Brazil, but only 11 have so far been proved to be of commercial significance. Reserves of metallic copper are estimated at only 523,000 tons, sufficient for ten years' consumption. This figure does not include the valuable deposits of 4 per cent copper and associated minerals, recently discovered at Vazante and Januaria, Minas Gerais.

In 1955 an important Sao Paulo enterprise began producing concentrates of copper and planned to supply the market with 8,000 tons, or 32 per cent of Brazil's requirements. Production should reach 18,000 tons in the near future. The Department of Mineral Production is also trying out a new process of extracting copper electrolytically from the Serval deposits of Rio Grande do Sul. Between 93 and 98 per cent of the metal content is extracted with reduced electric power and without the use of sulphuric acid. Brazil's imports of copper rose from 15,228 tons in 1955 to 26,944 in 1957.

National production of aluminium increased from 1,664 tons in 1955 to 9,200 (estimated) in 1957, while imports rose from 6,704 to 13,500 tons.

Two companies are producing aluminium in Brazil, namely Cia. Electro-Quimica S.A. (Elquisa), at Ouro Preto, Minas Gerais, and Cia. Brasileira de Aluminio (C.B.A.), in Sao Paulo. Control of the first-named was acquired by C.B.A., subsidiary of the Canadian consortium, Aluminium Ltd., after which Elquisa's output of ingots increased to 2,200 tons. In August, 1958, the company's new factory will start operating, raising annual capacity to 15,000 tons, while additions planned to date will increase output to 35,000 tons.

C.B.A. inaugurated its plant at the company town of Aluminio, near Sorocaba, in June, 1955. Production of aluminium ingots reached 4,707 tons in 1956 and 7,000 in 1957. Hydraulic and electric machinery for the first expansion has been acquired to raise output to 20,000 p.a.

C.B.A. plans to instal four 30,000 kW. generators at its power stations on the Juquia-Guacu river and connect them to the 35,000 kW. station at Fumaca. When done the annual capacity of the aluminium factory will be in the order of 50,000 tons. Four important Sao Paulo companies are transforming aluminium ingots into sheet, wires, cables, tubes and alloys.

Brazil has abundant reserves of bauxite for an important aluminium industry. The most valuable occurrences at present known are those of Pocos de Caldas, Minas Gerais, with measured reserves of 150,000,000 tons. Other deposits exist in Espirito Santo, Bahia, Sao Paulo and N. Brazil.

National production of zinc is insignificant and Brazil depends on imports, which oscillate between 13,000 and 19,000 tons yearly.

The most promising occurrences of zinc minerals are those of Januaria and Vazante, Minas Gerais. Januaria deposits consist of a complex ore containing willemite, calamine, zincite, sphalerite, etc.; in those of Varzante, zinc is associated with lead and copper. Zinc is also closely associated with lead in the Ribeira Valley, Sao Paulo, and in Furnas where the ore reserves are estimated at 20,000,000 tons, with a 17 per cent zinc and 7 per cent lead content. An important deposit of sphalerite exists in the Morro do Bule, Ouro Preto, Minas Gerais.

As reported in *The Mining Journal* of November 2, 1956, Companhia Mercantil Industrial Inga has installed pilot plant to perfect a new method of processing calamine ores to produce metallic zinc. The ore contains 45 per cent Zn and the company will require 2,000 kWs. for an initial monthly output of 200 tons. Capacity will be raised to 1,500 tons later. Inga's method does not require high temperatures, avoids the risk of synthesis in the furnace and appears to have overcome the difficulty caused by the 25 per cent of silicate in the ores.

Lead and Tin

Brazilian production of lead increased from 2,948 tons in 1953 to 6,750 in 1957, while imports dropped from 21,086 to 17,512 tons (estimated). Plants now being installed at Santo Amaro, Bahia, and Nova Iguacu, Rio de Janeiro, should raise output to 20,000 tons in 1959.

Over 20 deposits of lead-silver minerals await prospecting in the Sao Francisco Basin. In the Ribeira Valley, between Sao Paulo and Parana, valuable lead mines are being worked and the Sao Paulo Government has installed plant to reduce the ore and refine the metal. Other occurrences exist at Cerro Azul and Imbuial, in Parana. In Sta Catarina the recently-discovered Blumenau mine, with estimated reserves of 1,000,000 tons of galena, is being worked and the ore processed by Cia. Mineração Sul-Brasileira.

Brazil's most important lead mine, however, is at Buquira, in Central-South Bahia, a comparatively recent find, where output in 1957 reached 2,650 tons of oxidized mineral with 50 per cent lead.

Production of tin increased from 1,203 tons in 1955 to 1,796 in 1957, while imports rose from 69 to 490 tons. The most important occurrences of cassiterite are at Barra Mansa, in the State of Rio; Sao Joao del Rei, Minas Gerais; Cacapava, Piratini and Encruzilhada, Rio Grande do Sul; Picui-Parelhas, Rio Grande do Norte; Mogi das Cruzes, Jundiai and Sorocaba, Sao Paulo; Mazagao, in the Amapa Territory, and Baturite in Ceara. Processing plant and an electrolytic separator have been installed at Sao Joao del Rei.

Companhia Estanifero do Brasil produces tin, using concentrates from Sao Joao del Rei and Bolivia. The company, which is associated with the National Steelworks, at Volta Redonda, is installing additional plant to refine low-grade concentrates. The modified electrolytic process adopted will reduce evaporation losses to less than 5 per cent, permitting sales below the present market price.

Prospects for an Economic Eurafrica

Recently, Premier Félix Gaillard, of France, invited the United Kingdom, the six countries grouped in the Common Market, together with Morocco, Tunisia, and Spain, to set up an economic partnership with a view to developing the Sahara. In our first article, "Mineral Resources of the Sahara" which appeared in "The Mining Journal", May 16, 1958, it was shown that this forbidding wilderness, twelve times as large as the home country, contains tremendous energy and mineral resources, capable of making a great contribution towards making up for the scarcity of raw materials that plague Western Europe and solving the industrialization problems of the adjoining underdeveloped countries. Enlightened self-interest has urged France to throw open the Sahara to prospective partners. It is vital to marshal the know-how and capital of Western Europe to develop the Saharan resources. Only a continent-wide market to absorb the Saharan raw materials and produce will make their costly exploitation a paying proposition.

IT is reckoned that the cost factors in the Sahara are four to six times as large as those normally obtaining in Europe. There are only six miles of roads to each 400 sq. m. Trying climatic conditions make frequent crew-rotation imperative, while the heat of the sun permits work during only eight months in the year. Heat and sand combine to expose machinery to tremendous wear and tear.

Thus, it costs from £35 to £70 to drill one foot for oil, against £15 in France. In the "ergs", those sand dunes overlaying subsidence areas, the construction of one mile of asphalt road and one mile of railway writes off respectively £40,000 and £30,000 over widespread areas. Locomotives must be especially protected from the abrasive action of the "Simoun" wind. To protect the tracks from being buried by that desert wind, trenches must be dug out along the whole length of line and watchers posted every few miles.

Lack of Communications

This explains why France has resisted the huge costs involved in the construction of a Transaharan railway to link the Mediterranean port of Oran to Niamey, on the Niger river. And yet, all along the planned 2,490 mile track, engineers have pinpointed literally scores of hitherto unsuspected mineral deposits, some capable of commercial exploitation. The first section, via Colomb-Béchar, in active service for these past 16 years, finishes abruptly 37 miles south of the above town, at the edge of the Guir river—the engineers having not yet assessed how to span it economically.

The inadequate means of communication account for the small development of this area's large mineral deposits. A southward extension will tap the copper orebodies in the Ougarta range, situated along the path of the planned track, while it will take only two small-distance feeder lines to transport to Colomb-Béchar the iron ores of Illi N'Tourda and the lead and manganese resources from Taouz and Guettara.

Temperatures in the Sahara may vary between 50 deg. F. and 150 deg. F. within 24 hours. To combat this temperature range and to withstand the Simoun wind, European personnel are housed in climatized cabins

(By courtesy of the Royal Dutch Shell Group)

The delay in railway construction is a blessing in disguise. Instead of cutting straight across the desert, via In-Salah, as originally planned, the course of the track may be curved to serve deposits recently unearthed, mainly in the Hoggar region. Thus, no costly feeder branches will be needed to link these deposits to the trunkline.

Need of Cheap Transportation

At the terminal, two feeder lines should be provided to evacuate, via Niamey, the mineral wealth of the Adrar of Iforass and Air. The former boasts considerable copper ores and must carry many other commercial minerals, since it has not been the scene of volcanic activities in recent geological eras.

Currently, neither these resources nor rocks carrying commercial amounts of tin, tungsten, and wolfram from Air are exploited, because heavy trucking rates would render them uneconomic. Only the highest grade tin ores, occurring in alluvial form at Tarrouadji and El Mekki, are selected for concentration. After a long journey by truck, the Kano-Lagos railway and ore carriers, the concentrates are delivered at Liverpool. Far more important tin reserves exist in primary beds, but their development awaits the advent of cheap transportation.

Such also is the case with the bedrock carrying seams containing 68-72 per cent iron at Fort-Gouraud, Mauretania. Perhaps milliards of tonnes of those quartzites, extending anything up to 6,600 ft. in depth, are commercially exploitable on account of their 45 per cent metal content.

Decantation and degassing furnace in the Alucam aluminium works at Edea (Cameroons)
(By courtesy of the Ministry of Overseas France)

The Mines de Fer de la Mauritanie (MIFERMA) proposes to export these ores to the tune of 4,000,000 tonnes a year, representing some 20,000 tonnes per work day. It will take 16 trains a day, 30 locomotives and 600 freight cars to handle this traffic. A well-equipped port should be provided on the Atlantic, but natural deep water facilities are not available. The waters adjacent to the shore line are very shallow and considerable dredging will be needed to construct this outlet, which must be the largest harbour on the Western coast of Africa between Algiers and The Cape, dwarfing even Dakar.

Choice of a Terminal

But what terminal to choose? Since Fort-Gouraud itself is situated a few miles from the Rio de Oro border, the shortest 237 mile route lies across this Spanish territory to its Villa-Cisneros; it is also the easiest to construct, requiring £30,000,000. But the Mauretanian leaders complained that such East-West facilities, traversing Spanish territory almost the whole way, would drain away the population of Northern Mauretania and resettle it along the track.

By Maurice Moyal

Editor of "Petroleum Mirror" the monthly newsletter of the French petroleum industry.

To placate local opinion, Mauretania's Port-Etienne was chosen as the terminal. This would have the effect of making the railway 50 per cent longer and costlier, increasing the freight rate per tonne from £1 to £1 10s. But the track would cut through a small section of the Rio de Oro. Spain refused to grant right-of-way to a railway served by a French port.

Two routes skirting the borders to the East and South have been under consideration. The former, 425 miles, would cut through an area of shifting sand dunes, calling for consolidation and several feats of engineering. The latter, 25 miles longer, would be easier to build. Copolani, a small port between Port-Etienne and Nouak-Chott, would be its likeliest outlet.

The Mines de Cuivres de Mauritanie (MICUMA) has been confronted with similar problems in the evacuation of its Akjoujt copper ores. After toying with the idea of a fleet of big airplane carriers, the venture has settled for a cheaper railroad. Port-Etienne is 187 miles distant. But here again, shifting sands stand in the way.

It might prove economical to link the two projects providing thereby a single track along the home stretch and one port. Now that Spain has been offered a share in the development of Saharan wealth, she might grant the right-of-way. It will require a 315-mile railroad to the Atlantic to carry away the Tindouf's tremendous iron ore resources. Agadir in Morocco is their natural outlet. But this country claims the Tindouf area as her own.

Another major problem is how to obtain a satisfactory supply of water for drilling, extraction and pulping operations in this seemingly parched country. An average oil well requires some 1,000 cu. ft. of water a day to drill; this had, in some instances, to be purchased from the hauler at £500. In modern steelworks, 250 tons of water are required to cool down every ton of coke used in the fabrication of steel.

Fortunately, it transpired that plentiful supplies were obtainable over widespread areas from wells that encounter aquifers in the Albian at 3,000-5,000 ft. MIFERMA, for example, was lucky to find the 17,600 cu. ft. it needs daily in such a source near its Fort-Gouraud deposits.

But MICUMA, which must consume a daily 210,000 cu. ft. drilled vainly some 20,000 ft. The precious commodity was tapped at Bennichab, 100 miles from Akjoujt. But since the copper orebodies are located some 500 ft. higher than the aquifer, pumping the fluid uphill would cost £350,000 a year—a crippling handicap. Another more favourably located source is being sought at the foot of the Adrar cliff. If it proved possible to tap the waters of the Oued Seguelil, which vanished into the sands, the Akjoujt project would become a sound business proposition.

In the Colomb-Béchar area, the resources of the water table are put at 35 milliard cu. ft. Several million cu. ft. could be consumed daily without drawing down materially the level of the fluid. The aquifers are regularly fed by the rains falling on the mountains that fringe that Northern section of the desert.

Impure Ores

Another drawback is the high amount of troublesome impurities that certain Saharan ores carry. The Djebel Guettara manganese for instance, contains 1.56 per cent of arsenic. Its 3 per cent sulphur content renders the Colomb-Béchar coal difficult for industrial use. The "Southern" iron orebodies are characterized by 30 per cent of silica. The high oxide amount contained in 8,000,000 tonnes of oxidized copper at Akjoujt severely restricts the interest of the deposits. French engineers are currently seeking to devise a particular treatment process for each case to overcome such troubles.

The fact that there are not enough European technicians, particularly geologists, to go round is a big obstacle. Thus, to explore the Hoggar pre-Cambrian terrains, only seven exploration teams could be put in the field. This 200,000 sq. m. area is regarded as very promising on account of its niobium, tantalum, tin, tungsten, nickel, gold and platinum resources, besides zinc and lead. By comparison, Canada, although three times less populated than France, keeps 200 geologists busy probing her Labrador iron orebodies alone.

Interesting Potentials

The most promising Eglab crystalline range, 400 miles south of Colomb-Béchar, has been the object of only cursory reconnaissance. The extent of the possibly large Mezarif coal find, only 150 miles from this town, is open to conjecture. Over 100,000 sq. m. of primary terrains, carrying lead, zinc, copper, manganese, as well as 250,000 of more recent geological overburden carrying potash, nitrate, sulphur, manganese and possibly petroleum, have been accorded only scant examination. The fact that this search must often take place hundreds of miles from the nearest human settlement greatly hampers reconnaissance. The smallest location in the wilderness requires a weekly convoy to keep it supplied.

The CFPA and SN Repal, joint owners of the mammoth Hassi-Massouad in North Central Sahara; CREPS, the discoverer of the Edjele Tinguentourine and Zarzaitine smaller pools in Eastern Sahara, had to create their own completely itegrated communities at Massouad and Maison-Rouge. At great cost these ventures have furnished their own utilities, sanitation, hospital, maintenance shops, radio network, refrigerated housing and the other amenities of civilization.

Labour Supply

On the other hand, these ventures have experienced no difficulties in hiring respectively 4,000 and 1,000 native workers, mainly "Harratines" from the Saharan oases. These negroids have surprisingly taken to modern technology, many attaining semi-skilled status.

Training programmes at Ain-Sefra, Djelfa, Laghouat, El-Golea, Ouargla and Colomb-Béchar provide African personnel, up to foremanship, for the local mining ventures. This training effort, coupled with mechanization, has permitted the mining force at the Kenadza-Ksiksou collieries to be cut down from 6,000 in 1946 to 2,000 at the present time.

Although a local miner draws only £7 10s. against the £20 made by his equivalent in France, this is nevertheless good payment by local standards. At Akjoujt, where 450 Africans are employed, the hourly scale is 1s. 6d. for a semi-skilled worker and 1s. for a labourer. Although such wages will soon be raised, to cut down the high turnover, the cheapness of African labour goes to offset somewhat the high cost factors currently prevailing in the Sahara. Even so, no single venture could create a large undertaking in Africa on its own, on account of the heavy financial investments involved. The simplest arrangement is a partnership of two or more French companies. Thus, Péchiney-Ugine have jointly built the ALUCAM aluminium plant, with a 45,000 ton yearly capacity, in the Cameroons.

Another usual arrangement is an association of French private and public capital, the latter supplied by either the Mining Bureau of Oversea France or the African Industrial Complex Organization. MICUMA for instance, is 50 per cent government-owned, the balance belonging to a private holding that includes Pennarroya and the Bank of Paris and Pays-Bas.

The third arrangement consists of joint partnership of French private and public capital with foreign interests. The MIFERMA comprises: Mining Bureau of Oversea France (21 per cent), French private interests (31 per cent) and the British Iron and Steel Federation (34 per cent). The last mentioned also has a substantial interest in the Compagnie Miniere de Conakry, exploiting the iron orebodies of the Kalloum peninsula, in French Guinea.

Cutting the Risks

To spread the risk inherent in the hunt for petroleum in the Sahara, two companies share a total of, say 12 concessions, aggregating ten of thousands of sq. m., under a 51-49 per cent cross-interest arrangement, each retaining a majority interest on its singly-owned block. Hassi-Massouad has been brought in under such an agreement between CFPA and SN Repal, while 35 per cent Shell-owned CREPS shares the three East Saharan pools with 65 per cent Shell-owned CPA.

The former partnership released recently, after a five years' term, half of its original acreage, representing some 24,000 sq. m. of potentially petroleum-bearing territory around Hassi-Massouad. This area has been shared with America's Phillips Petroleum, Cities Service, Sinclair and Newmont, in association with domestic private ventures. The 32,000 sq. m. relinquished in March, 1958, by CREPS mainly in the vicinity of Edjele, will doubtless be responsible for the second large-scale entry of foreign companies in the Sahara. The Compagnie Francaise des Pétroles, which owns also 23.75 per cent of the Irak Petroleum Co., is currently negotiating a working arrangement with Standard in regard to the Sahara.

Within the Coal-Steel Pool framework, the International Study and Industrial Co. has been set up to explore the feasibility of establishing a steel and ferro-manganese industry at Colomb-Béchar. The idea behind this is to link the coal and steel resources of the Continent with the petroleum of the Sahara.

It has been reported that Ferrostahl A.G. and four other steel-makers from Germany, in association with Belgian and Swiss banking interests, are contemplating co-operating in the development of the Tindouf iron deposits. The French Government has requested a loan from the World Bank for Reconstruction for exploiting the Fort-Gouraud orebodies. The Bank of Indochina recently established at Luxemburg the Société Consafrique, to channel European capital into the Sahara.

A Shared Enterprise

The Sahara offers scope for scores of similar initiatives. It is calculated that it will take £300,000,000 to get one Saharan industrial complex started. The fact that France has been able to devote only £700,000,000 to the development of all her oversea territories since 1945, shows how much the stupendous job of pulling the Sahara out of its age-old unproductivity is beyond her forces. Only by sharing this tremendous wealth with her European and African partners can France create a strong community of interests, insuring the benefits of their rational development to all concerned, and laying the basis for an eventual economic and political Eurafrica.

Technical Briefs

Direct Reduction of Iron Ore

A sample process for the direct reduction of iron ore to pig-iron or semi-steel has been developed and demonstrated in a prototype plant at Niagara Falls, Ontario. News of the process has been announced by Strategic Materials Corporation and Koppers Company Inc., which together have had a working agreement for the past six months for the application of certain metallurgical processes under development by the latter firm.

Engineering and cost studies are said to indicate the commercial feasibility of the process for use near ore sites and where relatively inexpensive electric power is available. The process does not appear to be immediately competitive at existing major steel production centres.

The patented method of direct reduction, known as the Strategic-Udy Process, is comparatively simple in operation. The equipment used consists of a rotary kiln, an electric furnace, and a standard materials-handling system. Iron ore is mixed with fluxes and with a low-cost source of carbon (e.g. bituminous coal, anthracite, etc.). This mixture is fed directly into a direct-fired rotary kiln, where it remains a free-flowing system of solid particles discharged at 1,100 to 1,300 deg. C. depending on the type of ores used. Combustible gas from the electric furnace may be used at the kiln, resulting in the use of very little additional fuel.

From the rotary kiln the hot charge is immediately directed by controlled feed into the reducing zone of the electric furnace, where a short arc is held slightly submerged in the slag by means of electric voltage control. This provides an intense hot-reducing zone in which the charge is quickly and completely reduced. The Strategic-Udy Process provides an effective control of reduction so that pig-iron or semi-steel can be produced. Slag additions can be made to control impurities and so produce a metal equivalent to or superior to pig-iron with respect to such elements as silicon, phosphorus and sulphur.

The metal may then be cast into pigs or transferred in molten form to a refining furnace, where alloying additions may be made if desired, to produce steel. The process thus provides for the direct and continuous production of steel from iron ore.

Pilot-plant tests indicate the following advantages for the Strategic-Udy Process. First, the process is flexible as regards ore size. Most ores (including flue dust) may be used without special preparation. The ores tested did not require agglomerating, sintering, briquetting, or nodulizing. Second, complex ores which are now of little or no value may be used. The process may be designed to selectively remove phosphorous, sulphur, copper, nickel, manganese, chromium, titanium, and other elements. In some cases the selective removal of constituents from the slag can result in the recovery of valuable by-product ferro-alloys.

Third, many hitherto uneconomic iron-ore deposits warrant re-evaluation in terms of the knowledge afforded by this new process. Fourth, this process permits latitude in the selection of a reductant and fuel, since coal, peat, lignite, or coke may be used. Fifth, control of carbon content is possible. Pig-iron with a carbon content of 3.5 per cent or semi-steel of 0.5 per cent carbon can be readily produced. The production of low-carbon hot metal obviously shortens the heat-time in the making of steel.

Other advantages include low power requirements that in combination with the ability to use a cheap reductant is a significant advantage of this process, and the fact that initial capital costs are low. This permits the economic installation of this process in areas where only a limited market for steel exists. The process is flexible and can be used for large installations or for units producing as little as 50 tons a day. Strategic-Udy plants can be closed down entirely in a very short time and started up from cold in three or four hours.

UPGRADING COBALT-NICKEL STOCKPILES

A recent Report of Investigations (No. 5388) of the U.S. Bureau of Mines describes attempts to upgrade Co-Ni stockpiles by a roast-flotation process.

The process is a simple means of improving the separation of complex sulphide mixtures containing pyrite by utilizing the fact that the iron sulphides are more readily oxidised than, for example, those of cobalt or nickel, and consequently reduce or prevent the former from floating. After a controlled oxidizing roast at 400 deg. C., laboratory flotation with conventional sulphydric reagents yielded an enriched concentrate assay 9.22 per cent Co and 11.43 per cent Ni from a feed containing 2.84 per cent Co and 3.57 per cent Ni, but recovery was only about 85 per cent and too high a percentage remained in the tailing.

INTERGRANULAR COMMINUTION BY HEATING

An interesting paper on the effect of heat treatment on intergranular comminution by J. H. Brown, A. M. Gaudin, and C. M. Loeb jun., appears in *Mining Engineering* of April, 1958.

It is pointed out that if the object of size reduction is to liberate the valuable minerals, ideally fracture should follow intergranular paths to the exclusion of trans-granular ones; that is, break along mineral boundaries so as to keep the particles as large as possible.

There are a number of recorded instances where heating prior to crushing appears to be favourable and less very fine material is produced. The effect on intergranular comminution does not appear to have been investigated, however.

The permanent separation of grains can be expected, as appreciable anisotropism in the thermal coefficients of expansion of pure minerals has been noted. Furthermore, differences in the thermal expansion coefficients of the minerals in a multi-component rock should produce a similar effect, whilst decomposition of any component should also promote separation of mineral grains. After carrying out tests on granite, syenite marble and franklinite ore, consisting primarily of one isotropic mineral, it has been shown that heating may result in marked improvements in the friability and in the size distribution of the crushed product.

The mechanism by which this is accomplished cannot be stated with any certainty, but it appears to be more dependent on physical changes in the rock at elevated temperatures than on chemical changes. The possibility of the improved results being simply due to introducing the energy required for fracture as heat rather than mechanically can be eliminated, as this should only affect fineness and not the shape of the distribution curve and should be much the same for different materials. In the case of granite, the effect could be attributed to the conversion of the quartz from the alpha to beta state, and this may be a factor, but is not wholly responsible as parallel tests using syenite gave similar results. Similarly, chemical change cannot be considered, as marble when heated in an atmosphere of CO_2 did not prevent breakdown, prevention of oxidation did not affect results on granite, nor did detectable chemical changes take place with syenite. Although not proved as yet, it does appear probable that either or both unequal expansion of individual grains or spalling because of different heat transfer rates through the various grains may contribute to the process.

RELATION OF MAGNETIC SUSCEPTIBILITY TO COMPOSITION

It has been shown that magnetic susceptibility is primarily dependent on iron content, but that in the case of the wolframite series the susceptibility fell with increasing iron content. It is suggested that this is due to the fact that the iron is present as Fe++, which has a lower magnetic susceptibility, whereas both ferric iron and manganese have greater magnetic properties. Consequently, when iron replaces manganese in (Fe Mn) WO_4 the net paramagnetic susceptibility is reduced.

It is commonly stated that ferberite is more magnetic than the other members of the series, but it is suggested that this apparent increase in the magnetic property is due to the presence of intimately locked crystals of magnetite.

As a result, any attempt to improve the grade of concentrate by finer grinding and further high-intensity separation would fail, but improvement should be sought by regrinding the low-grade concentrate and removing the magnetite with a low field intensity.

It is also interesting to note that the susceptibility of the wolframites tested varied inversely as the square root of the iron content, whereas in the case of sphalerite, where it is dependent on the iron content, the susceptibility varies directly as the square root of the iron content.

MINING MISCELLANY

The Röros Kobberverk, Norway, in 1957 mined 40,835 tons of ore with 1.81 per cent Cu content, and produced 3,348 tons of concentrates containing 19.34 per cent Cu and some gold and silver.

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The district officer of Kuala Selangor, in the State of Selangor, Malaya, Raja Ozam bin Raja Kamarulzamam, has disclosed that his district, the centre of the Malayan rice-bowl, is about to become a most important tin-mining area. The swampy, virgin jungle in Batang Berjuntai contains a considerable quantity of tin, said the district officer. Two large mining companies have almost completed their prospecting in the area and have already committed themselves to a total investment of about $M30,000,000 in setting up six dredges. One of the companies has brought over from California a special dredge, the assembly of which on the new site is already 75 per cent complete. The other company has two dredges already set up, and a third is on the way to the working site. When all the six dredges are working, about 2,000 people will be employed. The district officer also stated that there was a real possibility of other minerals being found in the district.

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The Soviet Union will require large numbers of ore crushers and grinders in the next seven years, according to recent reports appearing in a Soviet technical journal. Until 1956 such equipment was produced by one enterprise only, the Uralmashzavod. Recently another factory, the Leningrad Metal Works, started production of such plant. But these two factories are unable to satisfy the needs of the Soviet ore mining industry, and in addition the range of crushers and grinders manufactured by them is extremely limited. The shortage of medium and small-size crushers is particularly serious, and their performance and quality is poor. It is therefore essential that new models should speedily be made available to the mining industry.

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Hungary is to spend £18,810,000 this year constructing new mines and developing existing ones with the aim of increasing coal production by 1,500,000 tons over last year. More than £5,000,000 is to be spent on maintenance. Part of the investment will be spent on mechanizing underground operations. About £1,500,000 is earmarked for the purchase of electric drills, pneumatic drills, and transport equipment, and £4,320,000 will be spent on ventilators, pumps, and other mining equipment. Hungary mined 21,197,000 tons of coal last year, and in the first three months of this year the mining force is reported to have beaten all previous production figures for comparable periods. Average daily output reached 80,829 tons, a rise of 830 tons on the daily average of the previous quarter.

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American Smelting and Refining Co. has agreed to sell its Garfield copper smelter near Salt Lake City to Kennecott Copper Corporation. The price will be about $20,000,000 in cash and will include inventories of materials and supplies, adjacent real estate, and certain other assets of the smelter. The Garfield unit is the largest copper smelter in the world, processing approximately 625,000 tons of concentrate a year. For many years the principal ore supply has been from Kennecott's Bingham, Utah, open-pit mine. Acquisition of the copper smelter is another step in Kennecott's integration of its copper-producing facilities and operations.

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Concessions in rail freight rates have been announced for copper and copper ores produced at the Kilembe Mines, in Uganda, and the Macalder Mines, in Western Kenya. They have been made in the light of the depressed world copper price and will be subject to revision when this improves. The tariff for copper concentrates carried between Kilembe Mines in western Uganda and the Kilembe smelting plant at Jinja, in eastern Uganda, will be reduced by 15 per cent. The tariff for blister copper, which is carried from Jinja to Mombasa for export, will be reduced by reverting to the rate operating up to the end of September, 1957, when a 13 per cent increase was applied to all rates.

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Joint Sino-Soviet scientific expeditions in the Heilungkiang (Amur) river valley during 1957 are reported to have located deposits of graphite, lead, molybdenum, gold, antimony, coal and oil shale. A layer of magnetite deposits, 20-40 metres thick, was found in the eastern part of Sinkiang. New coal deposits have been found in Yunnan, not far from the Szechwan-Yunnan highway. The reserves are estimated at 1,500,000,000 tons. Further coal deposits totalling 390,000,000 tons have been found in southern Sinkiang west of Hami, 18 kilometres from the Lanchow-Urumchi railway now under construction.

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At the 1957 Congress of the Rhodesian Mining Federation, states the annual report for 1957 of the Chamber of Mines of Rhodesia (Incorporated), it was decided to request amalgamation with the Chamber so that the interests of the mining industry in Southern Rhodesia would be represented by one organization. Following negotiations between representatives of the two organizations, the amalgamation was effected as from November 1, 1957. To cater for the interests of the smallworkers, the Chamber has formed a Smallworkers' Committee, comprising representatives from each of the five existing Smallworkers' Associations.

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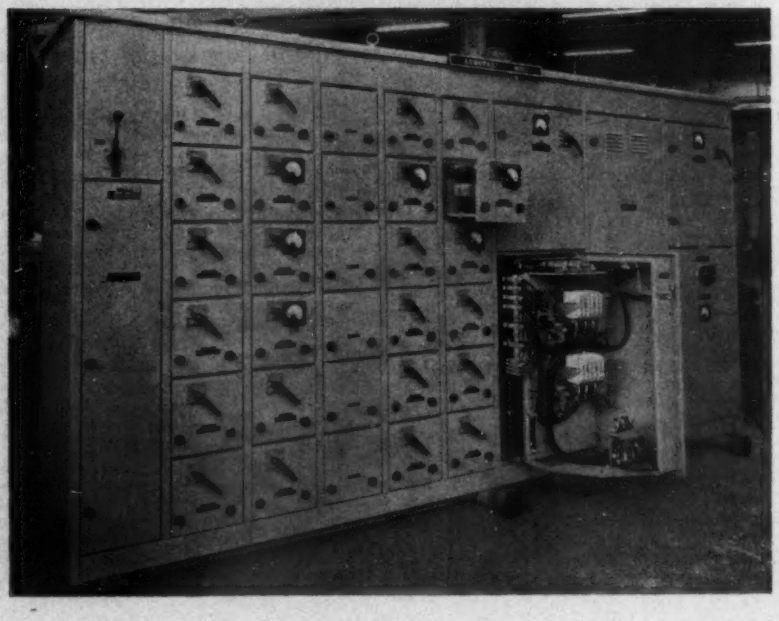
We understand that encouraging progress is being made towards bringing the property in Haiti owned by Consolidated Halliwell, of Toronto, nearer to production. Mogul Mining Corporation hold a substantial interest in this company. The concessions are held by Consolidated Halliwell through their wholly owned subsidiary, Sedren S.A., in the Terre Neuve district of the island, where prospecting has also been carried out with promising results over a much wider area than this district alone. Because of the low price of copper in 1957, work on the project has been mainly concentrated on the underground development of the richer section of the Meme No. 2 ore zone on which test work by Denver

This Chester Major switchboard, newest product of Brookhirst Switchgear Ltd., has been designed to the order of Brush Aboe (Canada) Ltd. for a tin mine in Tanganyika, namely N.V. Billiton Maatschappij, near Mbeya. The board will control the following equipment: The main mill motor, six Symonds feeder motors, one Ross feeder, three pumps, air heaters, fan and blower motors, return conveyors, bucket elevator, Dillon screen, exhauster, main fan and oil and lubricating pumps



Equipment Co. has proved a concentrate assaying 44.2 per cent copper at 98.6 per cent recovery. Taking account only of the Meme No. 2 zone, reserves stand at 1,800,000 tons, averaging 2.6 per cent copper, with minor amounts of gold and silver. On the basis of the 1,500 t.p.d. concentrator at present envisaged, there are sufficient reserves of high grade ore for six years' milling. The company has already spent some $2,500,000 on the property, including the provision of a considerable amount of mining equipment and surface work carried out on site preparation for the proposed concentrator. Negotiations are in hand to raise the capital required to bring the concentrator into being and the mine into full production and, on the basis of metallurgical results obtained, it appears that the whole scheme is likely to prove a very successful one.

★

Nickel Rim Mines Ltd. is to suspend operations as from May 31, states a report from Canada. In announcing the suspension, the president, Mr. G. H. Johnson, said it was due to the reduction in price and lack of demand for nickel. The company has produced sufficient nickel to meet all contractual requirements and will continue to ship nickel already on hand to fulfill outstanding contracts for the current year.

★

It is reported that East Sullivan Mines Ltd. may have to close down its copper-zinc-silver-gold mine in the Val d'Or area of Quebec Province. The mine is suffering from the consequences of depressed metal prices. The company states that it is losing $70,000 a month after providing for depreciation. In an effort to stave off a decision to close, it is asking its miners to accept a 20 per cent pay cut and has set May 31 as the deadline for acceptance.

★

In our issue of May 23, 1958, we described the split core barrel manufactured by Triefus Industries Ltd. for diamond drilling soft informations. A more recent development in the activities of the company is that it is now to represent two United States diamond drill manufacturers in the U.K. The American companies are Sprague and Henwood Inc., and The Diamond Drill Contracting Co. Manufacture of parts and accessories for certain of the products of these companies will be undertaken in this country to meet Board of Trade requirements.

PERSONAL

Mackay Industrial Equipment Ltd., of Feltham, announce the appointment of Mr. Michael F. Kelly as sales manager, Tractors, in succession to Mr. A. J. C. Fagg, who leaves the company on May 30.

★

Mr. Albert Hopkins has recently formed Hopkins Mining Consultants Ltd. with offices at Suite 102, 33 Melinda Street, Toronto 1, Canada, and acts as the company's president and managing director. The vice-president is Mr. I. V. Dellio, the secretary-treasurer Mr. H. C. Washburn, the chief geophysicist Mr. Ralph Hutchison, and the chief engineer Mr. Fred Dunn.

★

The death has occurred of Mr. Charles Edward Olliff-Lee, former chairman and managing director of A. Strauss and Co. Ltd., who passed away on May 18 after a long period of ill health.

Mr. A. J. C. Fagg has been appointed home sales manager of Merton Engineering Co. Ltd.

★

Mr. G. R. Lewis has been appointed managing director of Crompton Parkinson (Doncaster).

★

Mr. T. Johnston, chairman of the North of Scotland Hydro-Electric Board, has been appointed president of the British Electrical Development Association in succession to Viscount Chandos. Lieut.-Colonel E. H. E. Woodward has been appointed a vice-president of the Association. Mr. W. N. C. Clinch, M.I.E.E., Controller, Eastern Division, Central Electricity Generating Board, was elected chairman of the E.D.A. Council for the year 1958-59, and Mr. T. E. Daniel, M.Eng., M.I.E.E., A.M.I.Mech.E., chairman, North-Western Electricity Board, was elected vice-chairman.

★

Mr. B. N. Jolly, director and general manager of E. Boydell and Co. Ltd., has succeeded Mr. G. A. Hannah, managing director of Pegson Ltd., as president of the Federation of Manufacturers of Contractor's Plant.

COMPANY EVENTS

On April 25, 1958, the Chamber of Mines of Rhodesia and the Mining Industry Pension Fund moved to new premises at 5th Floor, Chamber of Mines Building, 47 Gordon Avenue, Salisbury. The telephone number and P.O. box number remain unchanged.

★

Chamberlain Plant Ltd. has moved to new works and offices at Crown Works, Southbury Road, Enfield, Middlesex. This company also states that it would be interested in acquiring a good agency for contractors' plant, preferably in earth-moving equipment. Chamberlain Plant Ltd. will handle the sales of the "Staffa" range of mobile and shop cranes, the Jenbach diesel-driven compressor, and various other items of contractors' plant.

★

As soon as they know the price per unit of Kariba Dam electricity, Rhodesian Alloys (Pvt.) Ltd. will start planning an expansion programme. Extensions would be made to the company's existing ferro-chrome refinery plant at Gwelo and would increase their electricity consumption by 50 per cent.

★

New branches of The Chartered Bank have been opened at Brunei Town and at Kuala Belait in Brunei State, north-west Borneo.

★

Armour Chemical Industries Ltd. has taken over the business of the Chemical Division and the Armour Laboratories, hitherto part of Armour and Co. Ltd. Mr. M. K. Schwitzer, who has been manager of the Chemical Division, continues to be in charge of all the industrial chemicals sold by Armour Chemical Industries Ltd.

★

A new export division has been created within the sales department of Caterpillar Tractor Co. Ltd. to provide an improved service with dealers outside the United Kingdom. Mr. G. P. Robertson has been appointed manager of this new division. He is succeeded as London office manager by Mr. W. Muir.

CONFERENCES AND EXHIBITIONS

The Confederacao Nacional da Industria (Brazilian Federation of National Industries) is organizing an International Investment Conference, to be held in Belo Horizonte, Minas Gerais, from June 23-26 inclusive, and then in Araxá, a watering place in Minas Gerais, on June 27 and 28, with finally a visit to the site of Brasilia, the new Federal capital, on June 29. The object of the Conference is to provide potential investors in Brazil with as much information as possible about the potentialities for investment in the various States. Inquiries should be addressed to Commercial Relations and Exports Department, Room 5348, Board of Trade, Horse Guards Avenue, London, S.W.1 (telephone Trafalgar 8855, extension 2193), quoting C.R.E./18/57.

★

An international symposium on cardio-respiratory diseases in industry will be held in Montreal, Canada, from June 16-18, 1958, under the auspices of the University of Montreal and of McGill University.

★

"Electricity and World Progress: Britain's Contribution" will be the theme of the Tenth Electrical Power Convention, to be held at Brighton from June 16-20, 1958.

★

A five-day course for junior executives and management trainees, organized by the Industrial Welfare Society, will be held at Robert Hyde House, 48 Bryanston Square, London, W.1, from June 30 to July 4, 1958.

★

The Council of Underground Machinery Manufacturers is to stage a comprehensive exhibition of their industry's products at Olympia (Grand Hall) from July 9 to 18, 1959. The ten years which have passed since the C.U.M.M. held its last exhibition in London has been a period of intense development in both the design and use of mining machinery and equipment throughout the world. The Council decided, therefore, that the time had come to provide an up-to-date "shop-window" to allow the world to see the immense strides that British manufacturers have made during the last decade. In addition to the displays by members of the Council and other manufacturers in the vast Grand Hall and Gallery, many visitors will be attracted by the three-day symposium to be held in connection with the exhibition. This symposium of shaft sinking and tunnelling is being arranged by the Institution of Mining Engineers.

AGENCIES WANTED

Hasemer Crane and Engineering Ltd., 546 Gardeners Road, Mascot, Sydney, wish to link up with United Kingdom firms in the crane industry, either on an agency basis or with a view to the manufacture of their products under licence. They are also willing to enter into arrangements with United Kingdom manufacturers tendering for New South Wales Government contracts for heavy equipment (other than electrical), fabricated steelwork, etc. United Kingdom firms interested should write direct to the Australian concern, notifying the U.K. Trade Commissioner, Prudential Building, 39-49 Martin Place, Sydney, that they have done so. B.O.T. Ref. ESB/25735/57. Telephone inquiries to Chancery 4411, extension 776 or 866.

Machinery and Equipment

Pumping Coal Across Country

The world's first cross-country coal pipeline, planned to carry 1,200,000 tons a year for Pittsburgh Consolidation Coal Co., United States, should begin commercial operation shortly. The line stretches 108 miles from Pittsburgh's Georgetown preparation plant in Ohio to the Eastlake power station of Cleveland Electric Illuminating Co. Reported to have cost $12,000,000, the system has operated on continuous runs of three weeks.

Various problems have had to be solved to conclude successfully the operation of the pipeline. In tests, oversize coal has plugged the line, while in addition it has been reported that station pumps south of Carrollton, Ohio, were not strong enough to force the coal slurry up a steep hill in the vicinity.

However, Cleveland Electric has contracted with Pittsburgh for approximately 18,000,000 tons of coal over fifteen years. Recent estimates show that rail freight charges for coal from Cadiz to Cleveland were $2.35 per ton, while delivery costs by pipeline were estimated at $1.60 per ton.

AIR CONTROL SYSTEM

The film "A Measure of Maxam", produced by the Maxam Division of the Holman Group and previously noticed in this journal, offered a descriptive background on the application of pneumatic and associated equipment for the automatic control of production processes. The conception was emphasized by literature distributed at a Press preview on May 7, 1958.

The film and the pamphlet bring to mind once again the practical difficulties in the way of applying hydraulic power underground, more especially at, or near, the face where long pipeline circuits are involved. It would be interesting to know how far these difficulties might be overcome by the development of pneumatic controls which would in turn operate a compact hydraulic system at the face. Do our readers know of any experimental work being done along these lines?

A PRESSURE METERING VALVE

The pressure metering valve manufactured by the Goodyear Tyre and Rubber Co. (G.B.) Ltd. has been developed to provide a means of controlling the pressure supply to a hydraulically operated device. The valve illustrated will meter pressure from a 3,000 p.s.i. supply to a maximum delivery pressure of 1,500 p.s.i. to control varying loads. It can be operated either by a lever or a screw jack, applied to the operating plunger according to the type of control required.

The valve shown normally operates with a 3,000 p.s.i. supply pressure, but will maintain its maximum output pressure of 1,500 p.s.i. when the supply pressure is as high as 4,000 p.s.i. or as low as 1,550 p.s.i. By a change of balancing spring, the maximum delivery pressure can be increased to the maximum supply pressure of 4,000 p.s.i. The variable pressure output is achieved without a constant drain of fluid to return. Fluid is only returned when pressure is released. The overall dimensions of the valve are 7¼ in. by 1½ in. by 2⅞ in.

The valve consists of a body (*1*) with a bore containing a valve unit (*2*) which is controlled by a plunger (*12*). The valve in the illustration is operated by a screw jack, but this may be replaced by a lever if the installation calls for it.

The supply pressure is admitted to the valve unit by way of a coupling and drilling (*6*) through the body. Similar couplings and drillings are provided for the delivery pressure (*5*) and a return to the pump or reservoir (*7*).

When the plunger (*12*) is pushed in, the balancing spring (*11*) transfers the applied movement to the balance valve sub-assembly (*3*). The spring bears on the pusher (*10*) which moves the steel ball (*9*) on to its seat, sealing off the return passage through the stem of the conical poppet valve (*4*). Simultaneously, the poppet valve unseats, allowing a metered hydraulic pressure to be applied to the equipment being operated.

The delivery line pressure, acting over the cross-sectional area of the ball through the hollow poppet valve stem, compresses the balancing spring and allows the poppet valve to close under action of its return spring (*8*). At this instant the delivery line pressure is just sufficient to balance the effective load of the balancing spring.

When the load on the plunger is reduced, the load on the balancing spring is correspondingly reduced, and the steel ball is pushed off its seat by the delivery line pressure, thus opening the return line. As soon as the delivery line pressure is in balance with the balancing spring, the steel ball seals off the return passage.

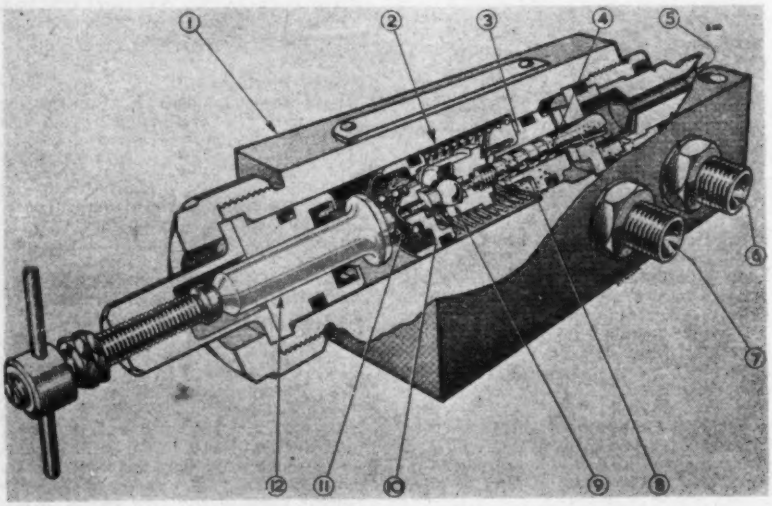
When the load on the plunger is completely removed, the ball is free to unseat as the pusher is held clear of the ball by the pusher return spring.

With a steady supply pressure and the maximum pressure stop set at any value above 150 p.s.i., the maximum variation in delivery pressure is plus or minus 25 p.s.i. With the maximum pressure stop set at any value above 150 p.s.i., and the supply pressure allowed to fluctuate between 4,000 p.s.i. and 150 p.s.i. above the pre-set delivery pressure, the maximum delivery variation at this set stop is plus or minus 50 p.s.i. If the valve is set at any value above 150 p.s.i. and fluid removed from the delivery line by a component such as a solenoid valve periodically opening to return, the maximum variation on the set delivery pressure is plus or minus 50 p.s.i. With the valve parked at any value above 150 p.s.i. for an appreciable period of time, 30 min. for example, the limits of pressure variation during parking is plus 50 p.s.i. and minus 150 p.s.i.

AN UNDERWATER SCREEN

An underwater screen has been marketed by Klockner-Humboldt Deutz which is finding considerable application for wet screening between 0.75 and 10 mm., and it is claimed that no impeding of particles can take place due to the capillary effect, whilst less water is used.

The unit consists of a trough-shaped screen-box, the underwater part being about 12 in. below the water-level, whilst the two ends protrude above the waterline. The discharge side slopes gradually so that the oversize is dewatered as it is conveyed out of the water. The undersize is discharged from the enclosing vessel by means of an adjustable orifice, whilst a small overflow is maintained. Vibration is imparted to the screen-box, which is supported on inclined carriers and is counterbalanced by the much heavier mass of the enclosing vessel filled with water, so that both masses



The Goodyear pressure metering valve

The Holman compressor-tractor combination in a coal chute at Cwmgiedd Colliery

vibrate in 180 deg. phase opposition. The movement thus given to the water is said to aid sedimentation of the undersize.

PORTABILITY IN MINING

Portability is an essential requirement in the kind of plant and machinery used in modern industry. An excellent example of the manner in which this requirement is met lies in the development of the Holman Tractair—where a portable air compressor finds almost its natural home on the back of a tractor. The tractor's towing duties are not interfered with, compressed air is always on tap, and can get to places formerly inaccessible.

An example of interest to the mining industry is the illustration of a Fordson Major tractor viewed from a coal shute at Cwmgiedd Colliery. The compressor is a front-mounted Holman FM 13 S driven from the side pulley power take-off.

The compressor is used for powering a sump pump and also to work a rotary drilling machine and pneumatic pick. At the rear of the tractor a Boughton Winch is powered from the rear power take-off shaft and pulls easily two trams of coal.

NEW TRANSMITTER-RECEIVER

One of the newest communication developments for widespread mining and other industrial operations is a single-sideband commercial transmitter-receiver recently developed by Barker and Williamson Inc., United States. The new equipment is intended for use in the high frequency range of 2.4 to 20 megacycles for commercial point-to-point or mobile service wherever the advantages of single sideband can be utilized.

Among these advantages is far greater signal strength from a smaller, lower-powered unit. Single sideband provides approximately seven times as much signal power as a comparable A.M. transmitter. Narrower bandwidth is a characteristic of single sideband transmissions, allowing the use of more channels within a given frequency spread. These features make single sideband particularly attractive in undeveloped areas of the world where radio telephone communications are used in place of land lines. In sections of the U.S., such as the Great Lakes region, overcrowding of available frequencies has led the Federal Communications Commission to consider adopting single sideband for commercial radio telephone purposes.

The new Barker and Williamson transmitter-receiver is adaptable to various methods of operation. It is normally used as a radio telephone. Its power output of 200 watts (minimum peak envelope power) provides communication ranges that exceed those possible with a full kilowatt of conventional A.M. (double sideband with carrier). With accessories, the unit can be easily adapted to radio teletype transmission with as many as four receiving and transmitting channels. It is possible to use a selective calling system where a number of stations share a common frequency and where it is inconvenient to monitor continuously for incoming calls. The SSB-200 can also be operated from a central telephone switchboard, or with remote telephone units.

This new transmitter-receiver can be set up for any four frequency assignments in the range covered. There are no restrictions on how the four channels may be separated or grouped. Frequency stability of 0.0005 per cent makes it relatively free from adjustments and tuning.

CLEANING FINE COAL

A piston jig designed to handle ¼ in.-0 coal has been in use for nearly three years at the Pittsburgh and Midway mine No. 19 preparation plant, and is said to operate most efficiently on all sizes above 35 mesh.

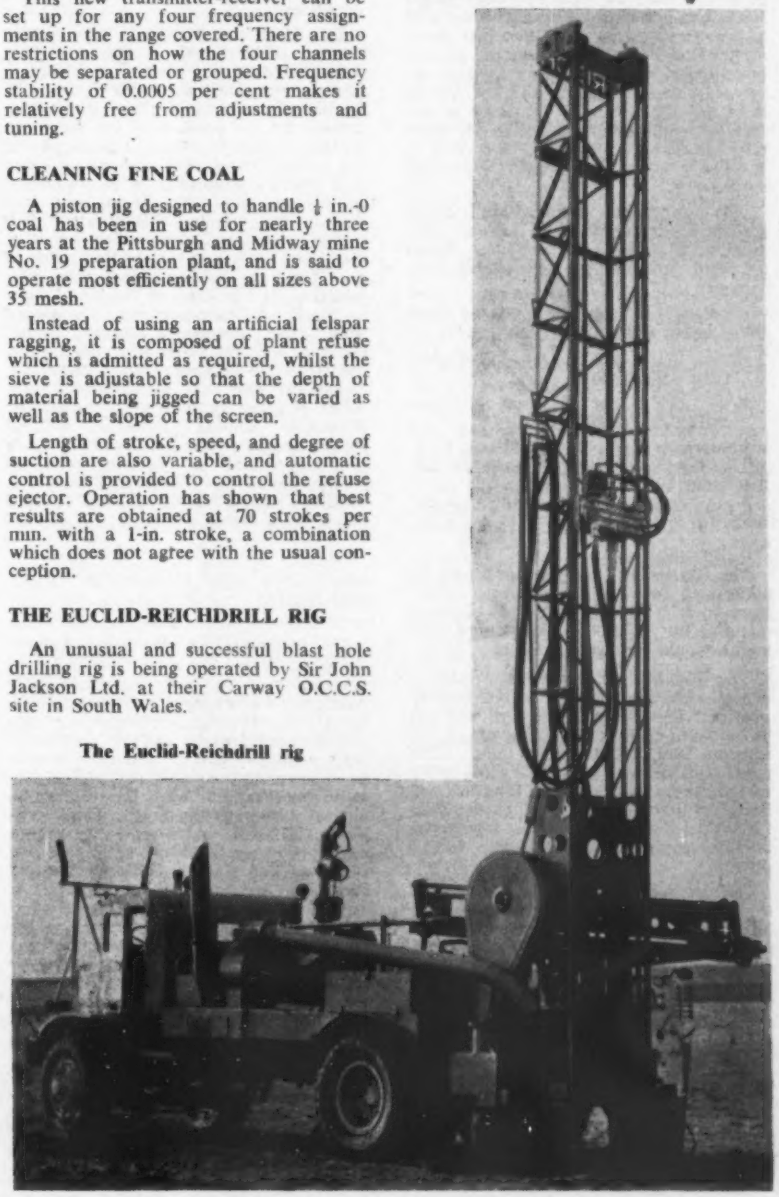
Instead of using an artificial felspar ragging, it is composed of plant refuse which is admitted as required, whilst the sieve is adjustable so that the depth of material being jigged can be varied as well as the slope of the screen.

Length of stroke, speed, and degree of suction are also variable, and automatic control is provided to control the refuse ejector. Operation has shown that best results are obtained at 70 strokes per min. with a 1-in. stroke, a combination which does not agree with the usual conception.

THE EUCLID-REICHDRILL RIG

An unusual and successful blast hole drilling rig is being operated by Sir John Jackson Ltd. at their Carway O.C.C.S. site in South Wales.

The Euclid-Reichdrill rig



The rig consists of a heavy duty British-manufactured Reichdrill rig mounted on an adapted Euclid FD 15-ton rear dump chassis. The power for the hydraulically operated drill is supplied by the Euclid's engine through the standard gear box and a heavy duty P.T.O.

When drilling, the weight of the rig is supported by heavy jacks which are permanently attached to the Euclid chassis. For travel about on or between sites, the drill mast is lowered on to a cradle over the cab making the unit completely self-contained and mobile.

AIR SPRING SCREENS

Allis Chalmers Mfg. Co. claim reduction of vibration as well as noise with their air-spring suspension, constructed of nylon cord and tough rubber and being inflated with air. Easy adjustment to weight differences is accomplished and altering the air pressure.

Metals and Minerals

Subsidies for U.S. Metal Producers

The Eisenhower Administration has submitted its proposals to Congress to pay subsidies to U.S. producers of copper, lead, zinc, fluorspar and tungsten (*vide The Mining Journal*, 9/5/59, p. 531). The proposals were contained in a letter sent by Mr. Fred A. Seaton, the Secretary of the Interior, to Mr. Richard M. Nixon, the President of the U.S. Senate.

There are two major additions to the preliminary announcement which was made a few weeks back. Both are obviously designed to go some way to meet the criticism that the plan might cause some tonnage of metal to be sold at give-away prices. The first lays down a floor under the guaranteed market price below which producers would receive no reimbursement, and the second is to the effect that the Secretary of the Interior would be authorized to set quarterly production limits with the right to suspend payments to offenders exceeding such limits.

The proposed stabilization prices and the annual amounts of domestic production on which the subsidies would be paid are as previously reported, namely:

Copper: 27½ c. per lb. delivered Connecticut Valley, 1,000,000 tons.

Lead: 14½ c. per lb., New York delivery, 350,000 tons.

Zinc: 12½ c. per lb., East St. Louis delivery, 550,000 tons.

Fluorspar, acid grade: $48 per s.ton. delivery Rosiclare, Illinois, 180,000 s.tons.

Tungsten trioxide: $36 per s.ton unit, f.o.b. shipping point, 375,000 s.ton units.

The Secretary of the Interior would be authorized to establish quarterly limitations on the total amount of each material on which the stabilization payments would be made.

The stabilization payments would be made to any producer during one quarter provided that the producer did not sell more than 2,500 tons of copper, 1,250 tons of lead, 1,250 tons of zinc, 1,250 tons of fluorspar, and 3,000 s.ton units of tungsten. In the case of tungsten, the Secretary would not buy more than 15,000 s.ton units per quarter from production originating in any one mining district.

In his letter to Mr. Nixon, Mr. Seaton said it was anticipated that the proposed programme would be instrumental in reinstituting in some cases and continuing in others the contractual relationships between domestic producers and the consuming industries with a minimum of interference with producers of friendly foreign countries. It was believed, he stated, that the proposals provided immediate assistance to those industries which currently needed stabilization and, at the same time, ensured a strategically sound domestic minerals and metals production balance.

The reception given to these more detailed proposals is still hostile and the clamour for higher tariffs continues from U.S. producers. In London, second thoughts on the plan are still unfavourable, as it is felt that basically such a plan will tend to increase production in the U.S., which eventually must mean less imports and, therefore, more copper outside the States trying to find a home. Unless the volume of trade increases this might have a disastrous effect on the price before non-U.S. producers could take the necessary action by further reduction in output, and hence lower purchasing power from primary producing countries.

In Canada, however, the initial reaction of the metal industry to the U.S. Administration's price stabilization scheme has been distinctly favourable, on the grounds that it places the burden created by the position of the American mining industry where it belongs—on the United States itself and not on other and friendly countries. It is considered in Canada that the programme will obviate the taking of tariff steps that would invite retaliatory action by other countries. It is pointed out that much of the American mining production, particularly in the case of lead and zinc, is based on low-grade mines equipped with older machinery, which cannot compare with the newer and higher grade industries in Canada and elsewhere. Canadians feel that the proposed subsidies of a few cents would maintain the American mining industry without stimulating any great amount of extra production and so reducing sales by foreign countries. They recall that U.S. subsidies during the war did not produce much extra metal.

BRITAIN'S NEW URANIUM PROJECTS

In a lecture to the 1958 British Electrical Conference, Sir John Cockcroft announced that the U.K. Atomic Energy Authority was building an extensive new plant for converting uranium ore into metallic fuel elements and that the chemical separation plant at Windscale was to be enlarged to provide a central fuel element processing facility for the whole nuclear power programme. These projects will result in considerable economies in the supply and processing of fuel elements for Calder Hall-type reactor furnaces. In consequence, the A.E.A. expects to be able to supply natural uranium Calder Hall-type fuel elements for the early stations of the U.K. nuclear power programme and also for similar stations exported overseas at a maximum price of £20,000 per tonne and to buy back the spent, or burned-up fuel elements, at not less than £5,000 per tonne. It was further announced that the Calder Hall station was to be used for a series of experiments into the behaviour of uranium fuel elements under higher heat ratings.

These projects should lead to a further improvement in the competitive position of atomic energy *vis-à-vis* other sources of electrical power, thus increasing the potential market for uranium in the coming years.

*

West Germany has become the first country other than the U.S. and Britain to sign a contract for the purchase of Canadian uranium. The contract, which calls for the delivery of some 12 tons of uranium oxide to Germany, is in the nature of a trial order. It is expected to be followed by a German order for 500 tons of uranium to be delivered over a five-year period.

ASBESTOS IN SOUTH AFRICA

A substantial increase in developed ore reserves at all the company's main South African centres was reported by the chairman, Mr. Giles Newton, at the annual general meeting of the Cape Asbestos Co. At the amosite mines the vertical shaft is well advanced and much progress has been made in mechanical handling and treatment of the ore and fibre. The demand for amosite fibre continues strong and confidence is expressed that 1958 will bring further improvement to the mining situation. On the Blue fields the company also had another successful year. Exploration of possible new deposits is being actively pursued and a number of interesting prospects are under review. Meanwhile, the company's principal sources of supply have reserves adequate for many years.

*

The Philadelphia organ *Asbestos* reports that during the first quarter of 1958 shipments of asbestos fibre ran at approximately 20 per cent below the same period of a year ago, due to a proportionate drop-off in the production level of major consumers. A pick-up of approximately 50 per cent above the first quarter is expected in the April-May level, but shipments will still be appreciably lower than those of the same period a year ago. Some production curtailment has been made necessary by the drop in business.

ITALIAN QUICKSILVER PRODUCERS SEEK TAX RELIEF

It is understood that Italian quicksilver producers are seeking a modification and possibly complete removal of the existing heavy manufacturing taxes on the metal. The taxes—32,000 lire per flask of 34½ kilo net weight and 800 lire per kilo of quicksilver contained in the ore — were imposed by the Italian Government in November, 1954. At that time the price of quicksilver was at the exceptionally high level of about £109 per flask f.o.b.

Today, the Italian export price has fallen to about £80, while the London spot price is about £76. The tax on the metal per flask is equal to roughly a

quarter of the present Italian price. It remains to be seen whether the government will yield to trade pressure. The view has been expressed that if some modification were made in the taxes, Spain would bring her export price quickly into line with Italy's.

In the first quarter of 1958 Italy exported only 85.7 tonnes of quicksilver against 566.4 tonnes in the corresponding period of last year.

INDIA'S MANGANESE EXPORTS

There was a steep decline in the tonnage of manganese ore exported from India in the second half of 1957, and this set-back is still persisting. Indian ore is meeting with stiff competition in foreign markets from other ore producers and the principal buyers are drawing to an increasing extent on other sources of supply.

Our contemporary, *The Eastern Metals Review*, states that several factors have conspired to push the Indian manganese ore industry into the doldrums. According to the Bharat Chamber of Commerce, the entry of the State Trading Corporation has prompted the foreign buyers, unaccustomed to buying from state monopolies, to look more and more to other sources of supply. The S.T.C. at present handles about 40 per cent of the country's total manganese exports. There seems to be some apprehension in the minds of foreign buyers that the S.T.C. might take over the entire export trade in manganese ore as in the case of iron ore. It is further stated that failure on the part of some shippers in India to utilize their quotas for high-grade ore has been due to lack of transport facilities, as a result of preferential treatment given to the movement of iron ore exported by the S.T.C. There is also, of course, the problem of contraction of world requirements of manganese.

Our contemporary suggests that one of the directions in which the government could help the trade is by announcing in advance its export licensing policy for the year starting in June, 1958. The trade has already impressed upon the government the need for declaring its policy for a period of five years at a stretch.

Indian production of manganese ore in 1957 is reported at 1,574,000 tons, compared with 1,687,000 tons in 1956.

ALUMINIUM BARTER DEAL

Canada and Norway have agreed upon a £71,000,000 aluminium deal whereby over a 20-year period Canada will barter 3,700,000 tons of alumina to two Norwegian-owned smelters in return for aluminium ingots. This deal is reported by Barclays Bank D.C.O. from Jamaica, where production of alumina is to be stepped up to meet the terms of the deal.

*

Aluminium production has been inaugurated by Ormet Corporation at the first of five furnace lines in its new $110,000,000 plant on the Ohio River, U.S.A. Ormet, jointly owned by Olin Mathieson and Revere Copper, hopes to have all furnaces going at an annual rate of 180,000 tons by the end of the current year. The new plant starts operations at a time when aluminium output has been reduced by major U.S. producers.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The better undertone noted last week has continued in the copper and zinc markets but the market for tin is again having to be supported by the buffer stock manager and the outlook for lead appears to be judged less favourably.

MORE COPPER CUTBACKS

The settlement of the Chuquicamata strike had little effect on the market, as it was realized that with a loss in production of something in the region of 35,000 tons, supplies to Europe would be affected for several months ahead. The effects of the announcement were also lessened by the news that the Phelps Dodge Corporation had made a further cutback in production, which brings their present rate to about 60 per cent of that current in 1956. Later in the week the Anaconda Co. announced a cutback which reduced their output to about 80 per cent of that for last year. It is expected in most quarters that these actions, with their immediate reaction on the U.S. domestic market, will go a long way to ensuring that there will be no further talk of reductions in price, following on the two rises of ½ c. per lb. each of which have taken place in the custom smelter quotations since our last report.

On the consuming side, the picture is still far from rosy as during April, products shipped from brass mills, wire mills and foundries, were at the lowest level since last July, being the equivalent of only 79,613 s.tons of refined copper, which was about 4,000 s.tons less than March and 37,500 tons less than in April, 1957. Orders booked in April also showed a decline over those for March, but present indications are that there has been some slight pick-up.

In Europe, demand has once more been intermittent, with the political situation in France having a restraining influence. But with sellers reluctant, prices on the L.M.E. rose during the period and at the time of writing majority opinion is that slightly higher prices will be seen during the next few weeks. On the market itself, turnover has been uninteresting and stocks of copper in official warehouses showed a slight increase of 225 l.tons at a total of 16,807.

UNEVEN EFFECTS OF TIN RESTRICTIONS

The tin market has once more had to absorb a tonnage of cash metal and it is believed that the buffer stock manager has had to buy rather more metal during the last week than has been the case for some time. Stocks in the U.K. were virtually unchanged at 18,463 tons and the contango remains steady at about 60s. per ton.

The advance statistics of the International Tin Council issued at the end of last week show that the restrictions scheme is still having an uneven effect. March production of tin-in-concentrates in Indonesia and Malaya were both slightly above the February level, whilst the Bolivian figure for February was less than half that in the previous month. Production of tin metal continued at a low level in Malaya and Singapore whilst production in Belgium, the Netherlands and the U.K. all showed an increase for the month, although the last three countries show very considerable drops in the tonnage produced during April. In general, stocks of both tin-in-concentrates and of tin metal showed a slight downward tendency. On Thursday morning the Eastern price was equivalent to £750½ per ton c.i.f. Europe.

QUIET LEAD-ZINC MARKETS

Stockpiling of lead in the United States comes to an end with this month's request for tenders, and with the outlook for the motor industry still very poor, it would not be surprising if prices were to fall still further. Some people are beginning to remember that before 1939 it was normal for the zinc price to stand above that of lead. The market itself has been quiet, with a tendency for the contango to widen, but there are few signs of the accumulation of large stocks of the metal, although it would not be surprising if deliveries to this country became heavier during the third quarter of the year.

The zinc market has also been featureless, but with a slightly better undertone, as Continental smelters are still taking in raw material based on a guaranteed zinc price several pounds higher than that prevailing in London. Obviously this cannot go on for long and is a sign that there is a strong body of opinion which considers that the curtailments in production which have already taken place should begin to have a direct influence on the market in the not too distant future. In April, the O.E.E.C. countries produced 71,778 tonnes of zinc compared with 71,979 tonnes in March, and as compared with April, 1957, the production showed a very slight increase.

Closing prices are as follows:

	May 22		May 29	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£178½	£178¾	£181½	£181¾
Three months ..	£180¾	£181	£183½	£184
Settlement ..	£178¾		£181¾	
Week's turnover	6,875 tons		6,500 tons	
Lead				
Current ½ month	£71¾	£71½	£70⅞	£71
Three months ..	£72¼	£72⅜	£71⅝	£71½
Week's turnover	2,275 tons		4,200 tons	
Tin				
Cash	£730	£730½	£730	£730½
Three months ..	£733	£733½	£733	£733½
Settlement ..	£730½		£730½	
Week's turnover	925 tons		1020 tons	
Zinc				
Current ½ month	£61½	£61¾	£61½	£61¾
Three months ..	£62	£62¼	£62	£62¼
Week's turnover	3,475 tons		4,650 tons	

London Metal and Ore Prices appear on page 643.

Mining Finance

Still A Free Market in Kaffirs

There appears to be considerable uncertainty in Johannesburg as to precisely what Dr. M. S. Louw has been seeking to convey in the speech he made to the Afrikaans Chamber of Commerce in Cape Town last week in the course of which he condemned " excessive " foreign investment with the Union. Dr. Louw is one of the most influential and respected of Afrikaner financiers. His directorships include the Industrial Development Corporation, the Volkskas Bank and the National Finance Corporation. It is, therefore, difficult to believe that his public utterances would diverge widely from current government thinking.

On the other hand, the emphasis in statements prior to the election by members of the government, no less than by the governor of the Reserve Bank, has been directed towards urging the creation of a more attractive climate in the Union for overseas investment. Against this background, Dr. Louw's remarks to the Chamber of Commerce sound odd. He is reported to have said that, " if we want a republic, we must see that our economy is more independent. Political independence must be linked with economic independence ".

His point appears to have been that most of the Union's large industries (he specifically instanced oil, car assembly and mining), were mainly or completely under foreign control, and he said that he wanted it to be made more attractive for foreign investors to make a part of their ordinary shares in their subsidiary companies in South Africa available to South African investors.

This point of view, in so far as it has substance, is understandable enough, and is by no means confined to South Africa. However, whatever validity it may have for other sections of South African industry it can have none for mining. In the first place, with very few exceptions, shares in every South African mining company are dealt in on the Johannesburg Stock Exchange and at current prices they cannot be regarded as over valued by the market. Moreover, in the case of the one or two finance companies whose shares are not quoted, there is no obstacle to purchase through the London market.

In general, it is our impression that shareholdings in South African mining companies are fairly equally divided as between the Johannesburg and London registers. Dr. Louw apparently asserted in his address that 60 per cent of the gold mining industry was in the hands of foreigners which, to our way of thinking, can only suggest lack of enterprise or lack of confidence among South African investors who, by the nature of things, should be far better placed to buy Kaffirs with discrimination than the foreigners living in London and other centres of imperialistic exploitation.

Incidentally, it is precisely in order to assist the South African investor in this operation that *The Mining Journal* publishes an airmail edition of its *Quarterly Review of South African Gold Shares*. If the South African interest in this publication is anything to go by, foreign investors in South African gold mining will soon be a minority.

Mr. Naude, Minister of Finance, emphasizes that there has been no change in the South African Government's policy relating to overseas investors, which are welcomed, but it is noteworthy that the Minister apparently abstained from commenting on Dr. Louw's suggestion that a commission of enquiry be set up to consider the implications of overseas investment in the Union. However, Dr. Louw himself has since explained that his purpose in advocating such a commission was not to " scare away " foreign capital, but to make it more attractive for foreign investors to make a part of their Ordinary shares in their subsidiary companies in South Africa available to South African investors.

LONDON MARKET HIGHLIGHTS

There was little cause for enthusiasm in gold shares or any other form of investment last week. Abroad, Metropolitan France, Corsica, and Algeria were in the midst of a major crisis. In Cyprus, Tunis, and the Lebanon, further outbreaks of violence seemed likely at any time. Meanwhile, at home, labour unrest continued to dominate the scene, and Mr. Cousins, stuck with a stale bus strike on his hands, and not much room in which to manoeuvre, hinted darkly of further "measures" in store.

In the resultant uncertainty, it was no wonder that the steam went out of the boomlet in South African gold shares. At the same time, it was obvious that there was no serious attempt to sell stock. Dealers discovered this when, after the usual precautionary marking down of prices on Tuesday morning, a sprinkling of "cheap" buyers appeared.

The fact that gold share prices lost relatively little of their recent rise was in the circumstances taken to be an encouraging sign. It gave rise to the opinion that when the political situation sorted itself out in France—and at the time of writing the picture seems to be clearing—gold shares could well resume their advance.

Some profit-taking was seen last week in the shares of the older mines that had previously been bought on gold price hopes. Crown, for example, came back 2s. to 27s. and Consolidated Main Reef were 1s. 3d. lower at 17s. 4½d. The newer mines were less affected and showed that investment considerations and growth possibilities commanded more attention than mere gold price speculation. St. Helena actually showed a further, albeit small, improvement at 41s. 6d., and on the eve of the encouraging borehole results Riebeeck hardened to 11s.

The Tin share market, which had been quietly drifting along in the doldrums was suddenly startled by the first effects on dividends and profits of the Tin Agreement's severe output restrictions. Ampat dropped to a five-year low of 6s. 3d. following the announcement of a halved dividend and profits of £89,107 compared with £242,155 in the previous year. Hard on the heels of this news came the Siamese Tin disclosure of profits down by half and dividend payments cut from last year's 60 per cent total to only 22½ per cent.

Unfortunately the Tin Agreement restrictions, while not so far having any appreciable effect on the metal price, must continue to hit tin company profits severely. More depressing results are probably coming over the next few months. Tin shareholders who have done well in the past from dividends and capital repayments might well consider realizing their holdings at present prices with the object of reinvesting at lower prices later on.

Other base metal sections remained entirely subdued last week. Lead-zincs eased a few pence and for most of the time Coppers fluctuated narrowly. At the time of writing, the copper section is looking a little happier on forecasts of a better demand for metal later this year. Buyers have stayed fairly cautious so far, but in view of the steep fall in share prices over the past eighteen months or so, any real improvement in the metal quotation would be quickly mirrored in share prices.

GHANA'S GOLD SUBSIDY BEARS FRUIT

Whatever attitude is taken towards the politics of Dr. Nkrumah's Government there can be no doubt that its enlightened policy towards gold mining, initiated well before independence and continuing at the present time, is paying handsome dividends. This was apparent from Mr. C. J. Burns' remarks at the annual meeting of Amalgamated Banket Areas on Wednesday.

The year 1956-57 was a difficult one for A.B.A. Monetary reserves had been depleted by the prolonged African strike in the previous year, while the Pepe opencast workings, at one time supplying more than 30 per cent of the mill feed, had become finally exhausted. Had it not been for the Ghana Government's timely assistance (in the form of a £200,000 grant to four low-grade producers of which A.B.A. is the chief beneficiary) A.B.A. might well have found the necessary increase in the tempo of underground development beyond its means. On receipt of its share of the grant, however, the company managed to raise the footage developed by 50 per cent to 26,792 in 1956-7 at a cost of £197,395, while in the first six months of

the current year the equivalent annual cost of development was £196,930.

The result of this increased development is apparent from A.B.A.'s milling returns. Shortly before the closure of the Pepe section, throughput averaged 70,400 tons monthly (of which about 21,000 came from Pepe) at an average grade of 3.5 dwt. Now, with all tonnage coming from underground, A.B.A. mills something like 60,000 tons of 5 dwt. ore each month. This is obviously no mean achievement and it is hardly surprising that the profits for 1956-7 were not up to the pre-strike level in spite of the company's strenuous efforts to keep the inevitably rising costs under control.

The future of A.B.A. must now appear brighter than for some considerable time past. Capital expenditure, heavy during the transition from opencast to underground, is showing signs of dwindling away, while profits in the March quarter were more than comparable with pre-strike earnings. Many promising areas accessible from current workings remain to be explored. And, perhaps most important of all, in view of the trepidation which many investors feel when considering "the jungle", the atmosphere in which the mine is operating is healthy. To quote Mr. Burns, "At this stage . . . relations with government and with the Mineworkers' Union have never been better".

At around 1s. 3d. A.B.A. look to have distinct possibilities on a medium-term view.

POWERHOUSE OF THE COPPERBELT

As the supplier to the Copperbelt of power which is both cheaper and more easily come by than Wankie coal, the importance of Union Minière du Haut Katanaga extends well beyond the fact of its being one of the world's major copper producers in its own right.

With the present demand situation for the red metal, it is all the more essential that production costs are kept to as low a level as possible. The news that Union Minière was able to increase its supply of hydro-electric power to the Copperbelt to 612,000,000 kWh. in 1957 (cross-connection with the Rhodesian system was effected as recently as October, 1956) is thus most welcome. Significant, too, is the fact that Union Minière's installed capacity now totals 520,000 kW., of which the Le Marinel plant, completed during the year, accounts for some 250,000 kW. Although Union Minière's own power requirements are on the increase, due to the progressive changeover from coke smelting to electrolysis, to increasing electrification of mining operations, and to the higher level of cobalt production, there should, therefore, still be a substantial surplus to meet Copperbelt requirements.

In his statement, M. Sengier, the chairman, expresses confidence in the long-term future, both of the metal and of his company. Apart from the production cutback (1957 production was 240,000 tonnes compared with a capacity of 260,000 tonnes and 1956 production of 247,700 tonnes) Union Minière's only concession to the depressed market has been to spread its capital programme over a slightly longer period than would otherwise have been the case.

Financial results of the year's operations were, of course, severely affected by the falling copper price, but not to the extent that might have been expected. Gross profit came out at 3,862,782,874 Belgian francs, a reduction from Frs.6,579,082,805. Allocations to reserve were severely cut from about Frs.1,000,000,000 to Frs.171,500,000, while the final dividend for the year of Frs.750 reduces the total distribution to Frs.1,500 from Frs.2,300 last year.

Tanganyika Concessions has a substantial interest in Union Minière.

ANOTHER GOOD RIEBEECK DRILL

Last week's suggestion in these columns that the 661 in. dwt. borehole in the northern part of the Riebeeck property might be the first of a series was confirmed by yesterday's news of further intersections in another hole put up from the Loraine haulage.

Values in this latest intersection, about 1,700 ft. south of the common boundary, were extremely good, including 10.9 dwt. over 41.9 in., 66 dwt. over 5.2 in. and 12.7 dwt. over 94 in. This last value is equivalent to almost 1,200 in. dwt., but in view of the considerable width of reef, it would be unwise to over-emphasize the in. dwt. value.

SIAMESE TIN PROFITS SHARPLY LOWER

Results for 1957 of Siamese Tin Syndicate showed an even more severe setback than had been anticipated. Preliminary figures reveal that consolidated net profits for the year amounted to some £224,000—a decline from £325,000 in 1956. It should be noted, too, that these earnings are arrived at after a much reduced tax deduction (£445,809 in 1956; £163,236 last year). A non-recurring taxation write-back (arising from the company's O.T.C. qualification) more than compensated for the fall, but the outlook cannot be described as other than depressing.

The final dividend is cut to 5 per cent, making a total for the year of 22½ per cent compared with 60 per cent in 1956. With an output quota for the first six months of this year of only 1,531 tons compared with the 1957 output of about 3,300 tons—which was itself low—and Lowland Lead Mines on care and maintenance, it looks as though Siamese Tin may well be glad of the strength of its liquid position.

The meeting, to be held in London on July 2, will be awaited with no little interest.

NOTHING NEW TO REPORT

In his annual statement as chairman of Union Corporation, Mr. T. P. Stratten confirmed the widespread belief that work in the Kinross Area was at present concentrated on attempting to define the area to be covered by the next mining lease application. The timing of the further exploitation of the field was a matter on which he chose not to comment, beyond saying that it was linked to the gold price question and to future cost levels. Since one of the probable mining areas in the Kinross district is believed to be of higher grade than the Winkelhaak property, which was floated at an even less propitious time than the present, it would probably be unwise to draw any specific conclusions from this statement.

Speaking to Winkelhaak shareholders, Mr. Stratten confirmed that trial milling is now under way on a modest scale. No results, however, will be announced until about the end of the year.

The reasons behind this decision are hardly clear. The argument, presumably, is that a wrong impression of the company's ultimate potential might be created by the low and irregular grade of development and dump rock. Nevertheless, most boards have now come to realize that silence is the breeding ground of rumour. Misleading a small and ill-informed minority is surely preferable to the situation of an uninformed market feeding on guesswork.

(*Continued on page 643*)

RAND, KLERKSDORP AND O.F.S. GOLD AND URANIUM PRODUCERS

Comparison and analysis of results for first three months of 1958 and 1957

Heading			*January to March*	*Rand Cos.*	*Klerksdorp Cos.*	*O.F.S. Cos.*	*Total*
Tons milled :	Millions		1958	11·9	1·5	2·4	15·8
			1957	12·6	1·4	2·4	16·4
Ounces produced :	Millions		1958	2·5	0·6	1·0	4·1
			1957	2·7	0·5	0·9	4·1
Grade per ton :	Dwt.		1958	4·2	7·8	8·2	5·2
			1957	4·1	6·9	7·3	4·8
Working costs per ton:	s. d.		1958	42/11	53/7	59/11	46/6
			1957	41/9	52/4	55/7	44/8
Working profits:	Gold	£m.	1958	6·0	3·3	5·1	14·4
			1957	6·6	2·4	4·2	13·2
Working profits:	Uranium	£m.	1958	4·6	2·7	1·5	8·8
			1957	4·2	1·9	1·4	7·5
Total profits :		£m.	1958	10·6	6·0	6·6	23·2
			1957	10·8	4·3	5·6	20·7
Dividends declared:		£m.	1958	—	—	6·1	6·1
			1957	—	—	4·0	4·0
Non-Europeans at end March			1958	238,000	37,000	59,000	334,000
			1957	249,000	36,000	58,000	343,000
No. of Companies included			1958	37	7	10	54
			1957	37	7	10	54

ST. HELENA GOLD MINES, LIMITED

Mr. C. B. Anderson, the Chairman of the Company, in addressing members at the Annual General Meeting held at Johannesburg on May 16, 1958, said that in 1957 the tonnage milled increased by 80,000 tons to 1,392,000 tons and the yield was slightly higher at 5.83 dwt. per ton. Although the average price received for gold was slightly lower than in 1956, the working revenue at £5,102,278 was £309,761 higher. Working costs rose by 1d. per ton to 41s. per ton milled and absorbed £2,852,183, so that the working profit for the year was £2,250,095, being an increase of £143,633.

The net profit was £2,199,305. Capital expenditure, mainly in connection with No. 2 Shaft, amounted to £1,135,837; £319,999 was transferred to Loan Redemption Reserve and two dividends totalling 1s. 7d. per share, or 6d. more than in 1956, were declared, absorbing £761,979, leaving an unappropriated balance of £835,599.

Development and Ore Reserve

The total development footage driven at 47,975 feet was 8,127 feet greater than in 1956. Of the 16,540 feet on Basal Reef and sampled 52 per cent proved payable, averaging 422 inch dwt. There was a slight reduction in the amount of payable footage and in percentage payability, but the average inch dwt. figure was somewhat higher. The ore reserve recalculated at December 31 last amounted to 3,250,000 tons, with an average value of 6.1 dwt. over an estimated stoping width of 56 inches, being the same as for the previous year.

Expansion Programme

The sinking of No. 2 Shaft was completed on October 25 last, when it had reached a final depth of 5,528 feet. Full-scale sinking commenced in October, 1955, so that it had taken only two years to complete this large shaft. Mr. Anderson said that the advantages gained in concrete lining, equipping, station cutting and development of the ore-pass system simultaneously with sinking had been amply demonstrated in the very rapid progress which had since been made with development away from the shaft, and congratulated all concerned on the speed and efficiency with which the project had been completed. Development from the shaft was now devoted mainly to cross-cutting to the Basal Reef on 15, 16, 17, 18 and 19 levels and cutting sumps on 24 level. There was considerable faulting in the area, but it was hoped to connect 15 level to the No. 4 shaft workings in the very near future, and further connections would be made as soon as possible thereafter. Accordingly, there was no justification for the separate publication of the development results from this Shaft. Only a small amount of reef had so far been exposed, but it was hoped to open up the area rapidly now that the cross-cuts were under way.

Eastern Portion of Mine

During 1957, Borehole W.M.1 was drilled from surface in the eastern portion of the lease area. The Basal Reef was intersected at a depth of 4,405 feet, assaying 27.09 dwt. over 39.5 inches, equivalent to 1,070 inch dwt. Earlier, the borehole had intersected a middle reef at 4,357 feet with a value of 66.0 dwt. over 9.3 inches. The results of the borehole were encouraging in that they confirmed former indications that on the eastern side of the property there was an up-thrown block of reef-bearing ground, and consideration was being given to the exploitation of this area which would require the sinking of a further shaft.

Future Outlook

The Chairman said that provided all went well and that faulting in the area did not prove to be too severe, No. 2 Shaft should begin to contribute some stope ore to the mill about the end of the year. The capacity of the Reduction Plant was being increased so that during 1959 it should be possible gradually to increase the rate of milling with a commensurate increase in profits. Major capital expenditure, however, was not yet complete and further shafts would probably be needed to open up other sections of the mine. Due to the rapid progress which had been made with No. 2 Shaft and the consequent bringing forward of expenditure originally scheduled for 1959, capital expenditure in 1958 was expected to amount to about £1,300,000, as against the estimate of about £800,000 mentioned last year. It was necessary to follow a dividend policy which would enable the Company to meet these liabilities as they arose. A dividend of 1s. per share was declared in March of this year.

Results in First Quarter of 1958

During the first quarter of 1958 the ore milled totalled 339,000 tons and the working profit was £538,833. Capital expenditure amounted to £250,287. The development footage driven totalled 13,107 feet, of which 3,445 feet was on Basal Reef and sampled disclosing 1,650 feet, or 48 per cent payable, averaging 12.2 dwt. over 33 inches, equivalent to 401 inch dwt.

A member asked what progress had been made in developing the No. 2 Shaft area and what the grade was. The Chairman replied that practically all development in this area had been off reef or had taken the form of station cutting. Development on reef had shown a grade higher than in the No. 4 Shaft area, but this was of no significance as the very small footage on reef bore no relation to the large area to be explored.

In reply to a query as to whether it was proposed to publish the No. 2 Shaft area development results separately, the Chairman replied that this was not envisaged as the area would be connected to No. 4 Shaft and would form an integral part of the mine. The position would, however, be kept under review.

The Report and Accounts were adopted. The retiring Directors, Messrs. P. H. Anderson, J. Boyd, and I. T. Greig, were re-elected.

WINKELHAAK MINES, LIMITED

Mr. T. P. Stratten, the Chairman of the Company, reminded Members at the Annual General Meeting held at Johannesburg on May 16, 1958, that the expectation last year was that underground development and the erection of the Reduction Plant would both have been sufficiently advanced to permit trial crushing to begin about this time this year. This expectation had been realized. The first sections of the plant were started up for test purposes in March of this year and test milling on a modest scale was now in progress.

Surface Construction and Housing

During the year under review all the necessary surface buildings and services required to take the mine to production at 60,000 tons per month were completed. In Evander Township, work continued to proceed satisfactorily on the provision of housing and amenities for the Company's employees; 264 houses had been completed and a further 34 were under construction. The South African Mutual Life Assurance Society's building comprising shops, offices and flats was completed towards the year-end. The opening of the first shops in the Township had made living conditions appreciably easier and it was hoped that work on the first school would start shortly.

Shaft Sinking and Development

Once sinking of Nos. 1 and 3 Shafts had been completed, development work had been pressed forward as fast as possible to open up the shallower portions of the mine and to prepare stopes for production. Owing to faulting and some delays through water, work in the No. 1 Shaft area had not progressed as rapidly as had been hoped, but progress in the No. 3 Shaft area had been encouraging.

The total development footage accomplished during the year was 29,683 feet, of which 10,365 feet was on Kimberley Reef and sampled, disclosing 6,645 feet or 64 per cent payable, with an average value of 8.1 dwt. over 47 inches equivalent to 379 inch dwt.

During the first four months of the current year development footage totalled 19,985 feet of which 9,740 feet was on reef and sampled, disclosing 65 per cent payable with an average value of 332 inch dwt.

In view of the hold-ups in the No. 1 Shaft area and the good progress from No. 3 Shaft, it had been decided to increase the hoisting capacity in the latter area by sinking a small parallel shaft, No. 3B, some 350 feet to the north of No. 3 Shaft, to handle men and materials, so that No. 3 Shaft could be used exclusively for rock hoisting. At the end of April, No. 3B Shaft had reached a depth of 207 feet.

Production

The Chairman said that the Reduction Plant was being tested under operating conditions with ore from the surface dump, ore from current development, and some ore from stopes. The scope of the initial milling operations would be extended and the tonnage treated would be gradually increased as additional stopes became available. The expectation was that within about a year the mine should have achieved a milling rate of 60,000 tons per month. The advantage of running the mill as early as possible, even though mainly on low grade ore from surface dumps and development rock, was to bring in some early revenue in order to keep to a minimum the total capital to be raised. During this period of preliminary milling, which might last

until about the end of the year, no declarations of results would be made.

Finance

It was estimated that in order to bring the mine to production at 60,000 tons per month the Company should be provided with funds of the order of £8,500,000. The arrangements concluded since the year-end to provide the Company with the additional £2,500,000 required over and above the initial share issue of £6,000,000 consisted of a five-year loan to the Company of £1,000,000 from the National Finance Corporation of South Africa, a long-term loan from the South African Mutual Life Assurance Society of £750,000 to be secured on the Evander Company's houses, and temporary loan facilities of £750,000 from Union Corporation Limited.

Expansion of Operations

The Company was thus fortunately assured of the necessary finance to complete the initial programme of taking the mine to production at a milling rate of 60,000 tons per month, and it was believed that the existing shaft system, including the new No. 3B Shaft, would be capable of handling higher tonnages than this. However, to increase the milling rate still further and to develop the deeper levels of the mine, additional shaft capacity would be required in due course. How best to provide this capacity and at what stage work should start was again under consideration in the light of information becoming available from underground development and from the drilling of surface boreholes. The sinking of No. 2 Shaft had therefore been deferred.

The results achieved to date amid the difficulties inherent in developing the first mine in a new field reflected great credit on all concerned.

The Report and Accounts were adopted. The retiring Directors, Messrs. T. P. Stratten, C. B. Anderson, and M. D. Banghart, were re-elected.

HYDRO-ELECTRICAL ENGINEER

WITH MECHANICAL ENGINEERING EXPERIENCE

Wanted for a large Mining Company situated in Upper BURMA, climate sub-tropical and healthy. Applicants must have technical qualification with mechanical and ELECTRICAL experience in the installation and parallel operation of generators and be able to take charge of a HYDRO-ELECTRIC power station which has an installed capacity of 10,000 kVA., and equipped with Francis Reaction Turbines and Generators at 3.3 kV. 3 phase 50 cycles, and with transmission at 33 kV. Four years' agreement; six months' paid leave, of which three months normally permitted after two years; contributory Provident Fund; free passage, medical attention and partly furnished quarters. Salary and allowances aggregate K.1,740 (£130 10s.) per month. Advise fullest details education, qualifications, experience, age and family status. Write Box C.607, Willings, 362 Gray's Inn Road, London, W.C.1.

Mining Finance—*Continued*

There was a similar state of affairs at the St. Helena meeting, presided over by Mr. C. B. Anderson. This meeting was awaited with no little interest for the results of initial development around the No. 2 shaft, expected but not forthcoming in the April quarterly. Mr. Anderson said that most of the development was off-reef, and although the proportion on-reef showed a higher grade than the area around No. 4 shaft, this was not significant because the very small area so far developed bore no relation to the large area to be explored. In reply to a shareholder's question, Mr. Anderson said that it was not proposed to follow the general practice of publishing results in the vicinity of new shafts separately, "as the No. 2 Shaft area would be connected to the No. 4 shaft and would form an integral part of the mine". Yet Van Dyk, of which Mr. Anderson is also chairman, has published results from its No. 5 shaft separately for some considerable time past, and is still doing so in spite of the fact that the mine is virtually at the break-up stage, robbing these results of the significance they once enjoyed.

Offer For Pattani Tin.—Pattani Tin, which was placed in liquidation in 1953, has received an offer on behalf of clients of Herbert Smith and Co. to purchase the entire capital of the company at 1s. 0½d. per share.

A.I.T. — Lonrho Deal.—In order to qualify as an O.T.C., London and Rhodesian Mining and Land has sold its investment portfolio to its subsidiary, African Investment Trust. As part of the transaction, Lonrho has subscribed for 100,000 10s. shares in A.I.T. at 82s. 6d., bringing its total holding up to 690,254 of A.I.T.'s 700,000 issued shares, or 98.6 per cent. Lonrho's provisional acceptance as an O.T.C. is effective as from March 19 last.

Mining No Cinderella, Says Dalgleish.—In his "Shareholder's Review", Mr. J. Dalgleish, chairman of the Camp Bird group of companies, says that mining is not to be considered the Cinderella of the organization. Indicated reserves at the original Camp Bird mine in Colorado total more than 1,000,000 tons, taking $25 per ton as the cut-off grade, while geophysical prospecting in Canada has given "very encouraging results". In particular, several thousand acres of land in N.W. Quebec have been staked by Camp Bird, following the pin-pointing of interesting anomalies by aerial survey. Properties covering gold, silver, manganese and uranium in other unspecified areas are also under close examination.

Tekka-Taiping to Liquidate.—Tekka-Taiping, the tin-dredging subsidiary of Camp Bird, will hold a meeting on June 2 at which the liquidation of the company will be proposed. Certain low-grade areas of the mine's property were sold earlier this year, and the remaining reserves are only sufficient for a few months' further working. The formal statement lodged with the Registrar of Companies indicates that at December 31 last net assets were sufficient to make a distribution of about 10s. per share. This figure will be augmented by the earnings of the mine between that date and final closure.

LONDON METAL AND ORE PRICES, MAY 29, 1958

METAL PRICES

Aluminium, 99.5%, £180 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) basis 19s. 6d./20s. 6d. nom per unit, c.i.f.

Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 10s. 0d. lb.
Cerium (99% net), £16 0s lb. delivered U.K.
Chromium, Cr. 99% 7s. 2d. lb.
Cobalt, 16s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 8d. per gram
Gold, 249s. 5½d.
Iridium, £22 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £310
Magnesium, 2s. 5½d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£20 oz.
Osmiridium, nom.
Palladium, £6 5s./£6 15s.
Platinum U.K. and Empire Refined £24/£25 oz.
Imported £22/£22 10s.
Quicksilver, £76 10s. ex-warehouse nom.
Rhodium, £40/£42 oz.
Ruthenium, £15/£17 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 75½d. f. oz. spot and 75½d. f'd.
Tellurium, 14s./15s. lb.

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Bismuth	30% 5s. 0d. lb. c.i.f. 20% 3s. 3d. lb. c.i.f.
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Rhodesian Metallurgical (semifriable) 48%	£16 5s. 0d. per ton c.i.f.
" Hard Lumpy 45%	£16 0s. 0d. per ton c.i.f.
" Refractory 40%	£11 10s. 0d. per ton c.i.f.
" Smalls 44%	£14 10s. 0d. per ton c.i.f.
Baluchistan 48%	£11 15s. 0d. per ton f.o.b.
Columbite ,65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	£26 5s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian—	
Europe (46% - 48%) basis 67s. 6d. freight	nom.
Manganese Ore (43% - 45%)	nom.
Manganese Ore (38% - 40%)	nom.
Molybdenite (85% basis)	8s. 5d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£37/£38 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	82s 0d./85s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90 - 95% V_2O_5	£10 per unit c.i.f.
Zircon Sand (Australian) (65 - 66% ZrO_2)	£14 5s. per ton c.i.f.

UNION MINIÈRE DU HAUT-KATANGA

The Annual Meeting of Shareholders of the Union Minière du Haut-Katanga was held in Brussels on May 22, 1958, **Mr. P. Gillet,** Chairman of the Board of Directors, being in the chair.

The Meeting approved the accounts for the financial year ending December, 1957. The Profit and Loss Account for 1957 showed a gross profit of 3,862,782,874 Belgian francs. Taking into account the amortization of the year, the provision for taxation on profits and the sundry charges, the available profit balance, including the amount brought forward, totalled 2,562,317,864 Belgian francs.

Out of this balance, 71,429,781 and 100,000,000 Belgian francs have been allocated respectively to the Reserve Fund and the Special and Contingencies Fund; a sum of 28,174,070 Belgian francs was carried forward. The amount left being immediately available for distribution.

Accordingly, the Meeting fixed the net dividend for the year 1957 at 1,500 Belgian francs net per share (or 150 Belgian francs per tenth part of a share). Taking into account the interim dividend of 750 Belgian francs paid in January, 1958 (75 Belgian francs per tenth part of a share), this entails a complementary dividend amounting to 750 Belgian francs net per share or 75 Belgian francs net per tenth part of a share.

Messrs. J. Cousin and R. Hutchinson, Directors, whose mandates had come to an end immediately after the Meeting, were re-appointed. Mr. L. Helbig de Balzac was re-appointed as auditor of the Company.

Mr. Sengier's Statement

After drawing the Shareholders' attention on the importance of the hydroelectric power plants completed during the past years, Mr. E. Sengier, K.B.E., Chairman of the Executive Committee, pointed out in his address the building, at the Luilu site in the Western region of the Union Minière's concession, of an important group of automatic electrolytic copper and cobalt plants.

Our plants, said Mr. E. Sengier, have produced 240,000 metric tons of copper this year. We have had no difficulty at all in selling the whole of this production despite the deep fall in prices which occurred at the end of 1957 and at the beginning of 1958 and despite the applying of contracts with purchase guarantee granted to new mines by the American Government. These contracts, as well as other measures contemplated in the United States, are not of a nature, Mr. E. Sengier added, to balance world production and consumption, which seems to be an essential condition to restore the stability in the metal prices.

According to approximate figures, the world production of copper in 1957 slightly exceeds the 1956 production. Consumption in the United States decreased, but on the other hand, outside of the United States, it increased by approximately the same quantity. In the aggregate, consumption has increased slightly.

Speaking of surplus, if the stocks on hand with the producers are still important, those of the consumers are very low.

In the world prospect, the Union Minière's particular situation is a relatively excellent one, explained Mr. E. Sengier, thanks to long-dated programmes and a cautious management during the years of prosperity.

The State remains the main beneficiary of this situation, as again this year, it draws directly from the Company's activity a total amount of 2,524 million Belgian francs, to which figure must be added the tax levied on the amount distributed to the shareholders.

In taking into account the world economical situation, the Union Minière as well as a certain number of other important producers, has decided to reduce momentarily its production of copper in order to place it in better relation with the sales possibilities, but considered at a long distance, pointed out Mr. E. Sengier, the future of copper seems favourable.

A brief outline of the Company's report justifies, concluded Mr. E. Sengier, the confidence expressed in the course of the preceding meetings, as to the future of the Company.

Points from the Board of Directors' Report

The Board of Directors' report draws attention to Union Minière's participation in several sections of the 1958 Brussels World's Fair, specially in the Belgian Congo and Ruanda-Urundi section and in the "Atomium".

This year, for the first time, the figures given for excavated ores (10,047,907 tons) include those of the Shinkolobwe uranium mine.

Copper production continues to be mostly furnished by the mines of the Western region and by the Prince Leopold mine. The Kamoto opencast mine is also taking an increasing part in this production and Kolwezi mine has been reopened after being closed down for more than three years.

In order to achieve the cuts in production figures decided upon in 1957, the furnaces of the Lubumbashi smelting plant have been slowed down on Sundays and holidays during the second semester. On the other hand, at the electrolysis plant of Shituru, production has increased. The manufacture of scalped wire-bars has been organised. The final aggregate of copper production in 1957 was 240,280 metric tons as against 247,452 in 1956. Other company's productions were cobalt, zinc concentrates, germanium, cadmium, and precious metals.

*

Due to a limitation of the cobalt selling possibilities, its production has been reduced to 90 per cent of the 1956 figures (i.e. to 8,115 tons). Since February, 1957, the price of this metal has been reduced to $2 per lb. in order to encourage its use. The Cobalt Information Centre, established in 1957, developed its function of popularizing new uses.

*

The Shinkolobwe concentration plant treated 311,373 tons of uranium ores. The uranium concentrates produced continued to be exported in conformity with the existing agreements between Belgium, the United States, and Great Britain. Orders for radium remained satisfactory; 89 gr. 313 of contained were furnished.

With its present production of germanium (13,064 kgs. of oxide), the Company appears as one of the world's most important producers of this metal, for which the demand is in regular progress.

*

117,250 kgs. of cadmium have been produced in 1957.

94,706 kgs. of silver and 86 kgs. of gold have been recovered through refining of products.

*

In order to spread costs over a longer period of time, programmes of works already under way have been revised and redistributed over the forthcoming years.

As, for example, in the case of the preparatory works at the Kamoto open mine, the general equipment at the West-Kambove underground mine and the construction of the new automatic electrolytic copper and cobalt plant at Luilu. The opening date of this plant has been put back to 1960.

*

In 1957, the hydrological situation appeared particularly good. A total of 1,916,763,021 kWh. has been produced by the four hydroelectric power plants operated for the Company, against 1,292,940,500 kWh. in 1956. These results have allowed the Company to increase to 612 million kWh. its power supply to Northern Rhodesia. Supply of energy to the public distribution centres has shown an increase of 27.5 per cent over last year's figure.

*

The Company has unceasingly carried on its social programme. Achievements in the fields of Health, Education, Housing, Recreations, etc., have developed continually.

At the beginning of 1957, the general salary level was raised and the replacement of various advantages by their cash equivalent was extended to a higher number of beneficiaries. The re-engagement rate of workers is particularly high this year. It reaches 93 per cent against 89 per cent in 1956.

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GOLD FIELDS AUSTRALIAN DEVELOPMENT

The Twenty-fifth Annual General Meeting of Gold Fields Australian Development Co. Ltd. was held on May 22 in London.

Mr. R. H. A. Neuschild, Chairman, in the course of his speech, said: During the year the mill at the Mount Ida Mine, which is our sole active interest, treated 35,240 tons of ore, virtually the same tonnage as in 1956, but the grade, at 8.95 dwt. gold, was lowered by 1.05 dwt. and in consequence 15,253 ounces were recovered compared with 16,611. On the other hand, the ore reserves at December 31, 1957, show a slightly increased value at 8.86 dwt. and despite treating 35,240 tons, only show a reduction of 18,000 tons.

The accounting focal point is the extent to which the Group net cash assets were built up over the year, viz.: £66,745, increasing the Group net cash assets at December 31, 1957, to £143,008. In accordance with our agreed policy, we made a further repayment of 1s. per share on April 22, 1958.

Since January 1, 1958, the net cash assets have increased and, allowing for the £100,000 repaid in April, they now stand at approximately £69,000. Naturally this full amount is not available at any given time for repayment to Shareholders, as a certain amount of working capital has to be retained in the business. As you see, we are on the way towards the fourth shilling, and if all goes well we should be able to look beyond that.

The report and accounts were adopted.

AMALGAMATED BANKET AREAS

The twenty-second annual general meeting of Amalgamated Banket Areas Ltd. was held on May 28 in London.

Major-General W. W. Richards, C.B., C.B.E., M.C., Chairman, presided. The following is an extract from his circulated Statement:—

The profit of £35,730 for the year ended September 30, 1957, has been largely utilized to write off Diamond Drilling Expenditure, £8,371, and Provision for Obsolete Stores, £25,000.

It was not until the end of the year under review that mining operations resulted in satisfactory profits and, I am happy to say, the improvement has been well maintained ever since.

The results of the first six months of the current year's operations, October, 1957, to March, 1958, have improved our Company's financial position very considerably.

Since the end of the year, both tonnage and grade have shown most satisfactory increases. The Mine is now producing monthly over 60,000 tons of ore averaging about 5.0 dwt. per ton.

Development has been stepped up considerably, totalling 26,792 feet, as compared with 17,323 feet the previous year.

The total available ore reserves at September 30, 1957, were computed at 1,281,107 tons of an average value of 5.487 dwt. per ton over a width of 39.13 inches.

Technical Efficiency

Mr. C. J. Burns, a director, said:—

On the technical side, every effort has been made to reduce costs and improve efficiency. For example, explosives which are consumed in considerable quantities have received the attention of your consultants and mine's staff. A careful study of this subject has resulted in increased efficiency inasmuch as since March, 1957, the explosive costs per total footage of development have resulted in a saving of £9,612 per annum, and for mining of £29,665 per annum of total pay ore mined, a total saving of £39,277 a year. On the power side, careful planning and spreading of the electrical load have resulted in very economical operation of the power plants throughout the year.

The report and accounts were adopted.

The Directory of Directors, published by Thomas Skinner and Co. (Publishers) Ltd., is one of the most widely used of business reference books. With the current edition, the work reaches its 79th year of publication. The whole comprises 940 pages, including index and a number of display advertisements.

The Directory contains the names of directors of all public companies in the United Kingdom, together with the names of the directors of a large number of private companies. Although published annually, *The Directory* is under constant revision, and a total of well over 30,000 names are listed in this edition.

Throughout the inclusions, an asterisk is placed against the names of members of the Institute of Directors. Notices and additions received while the work was at press are to be found at the end of the volume.

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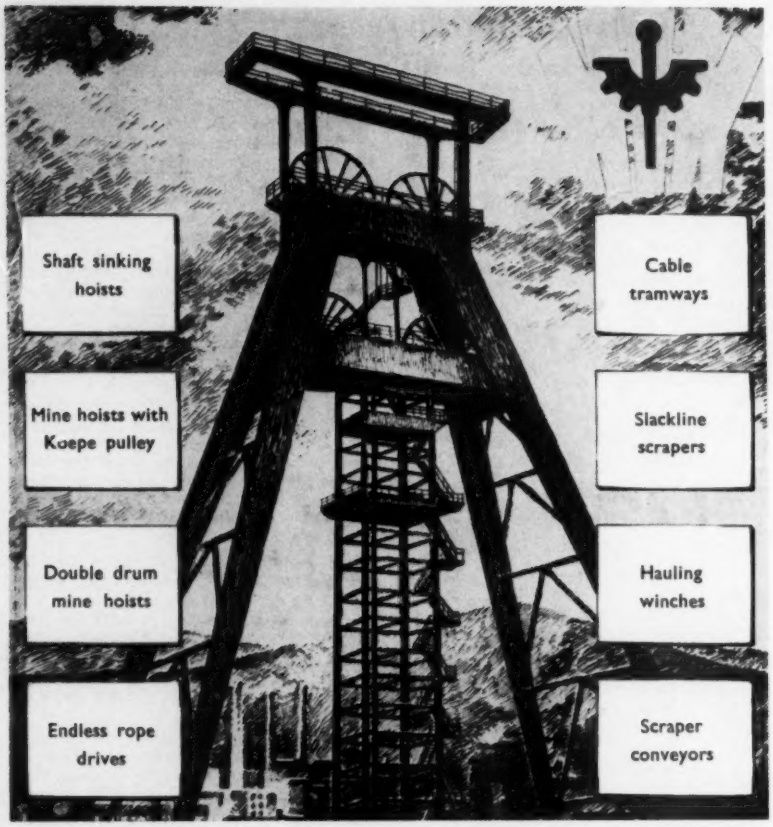

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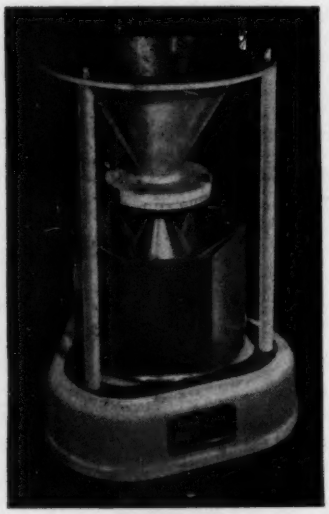

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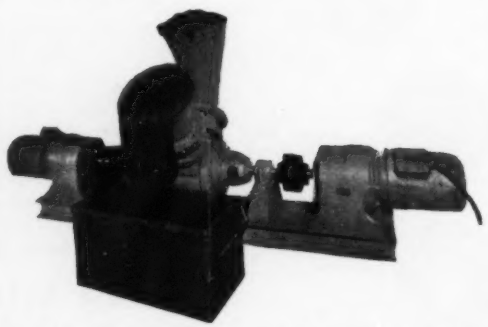

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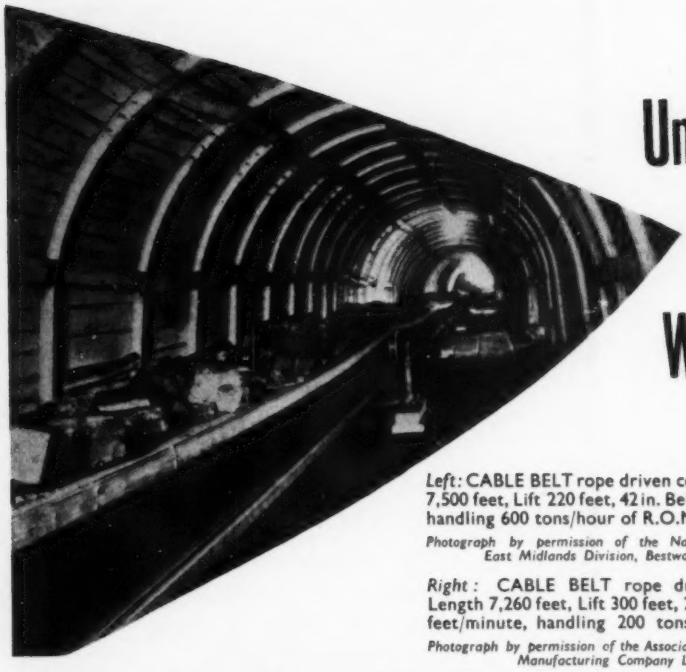

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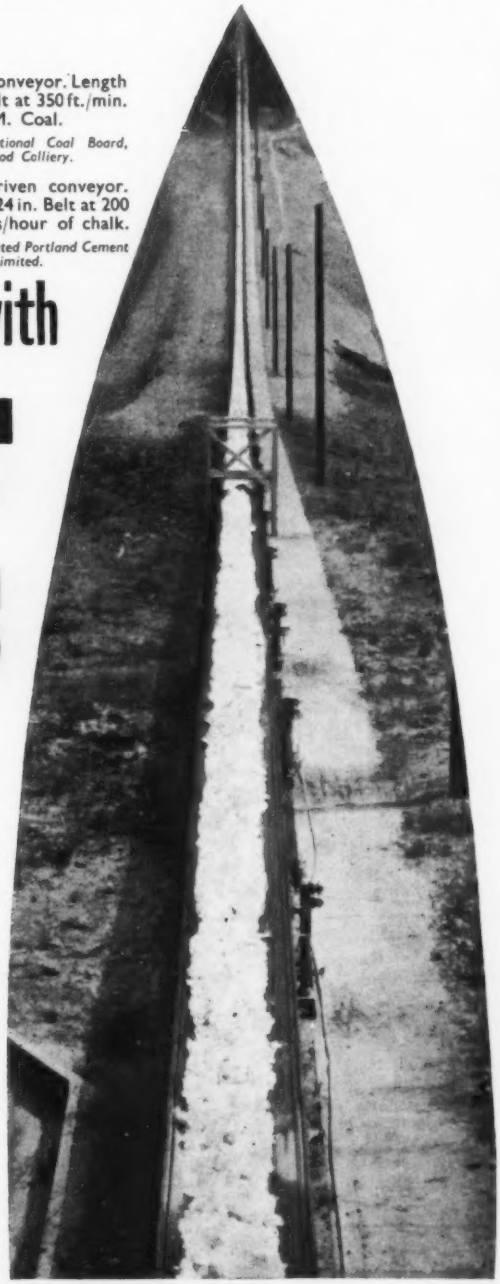

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